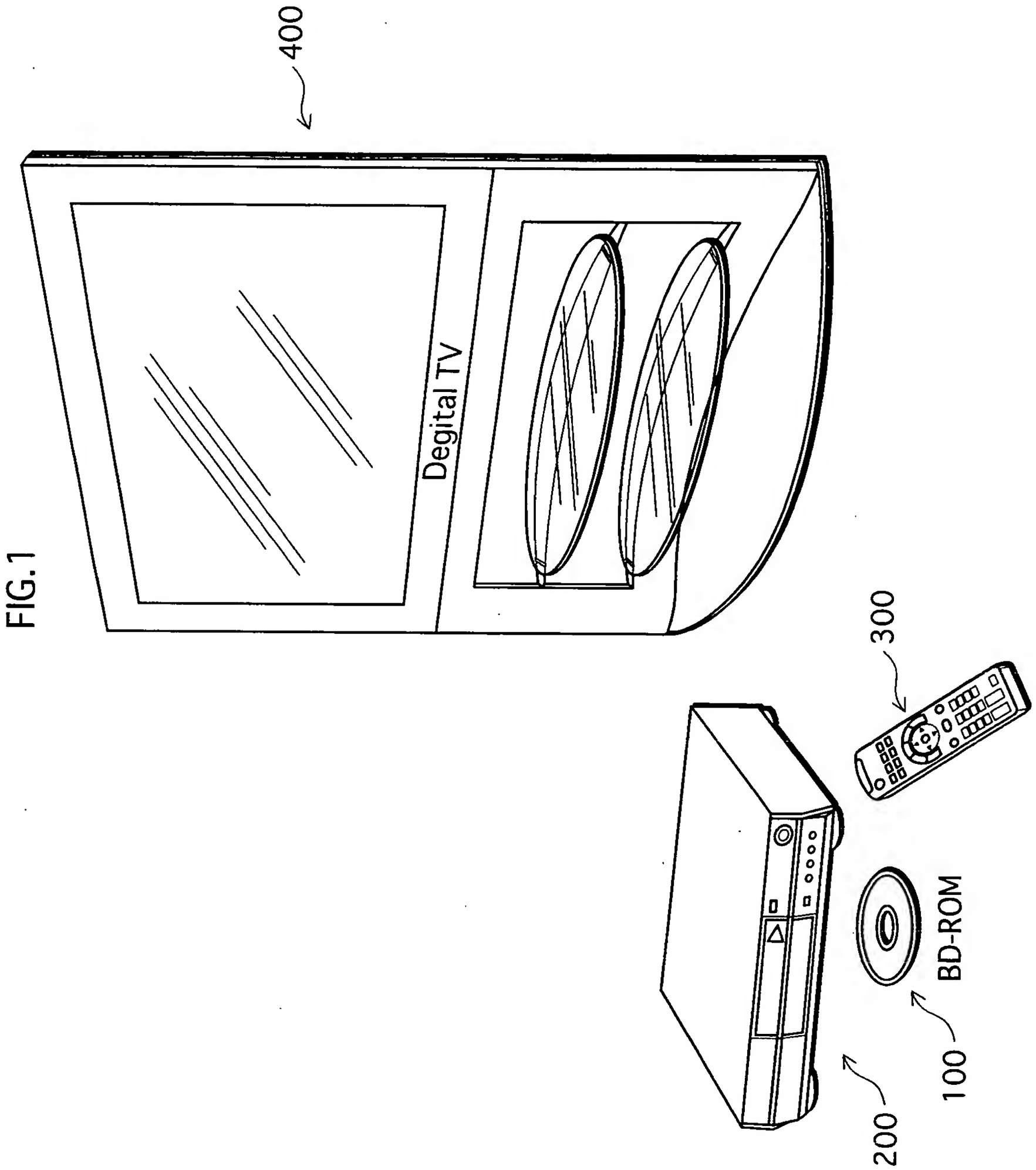


FIG.1

FIG.2

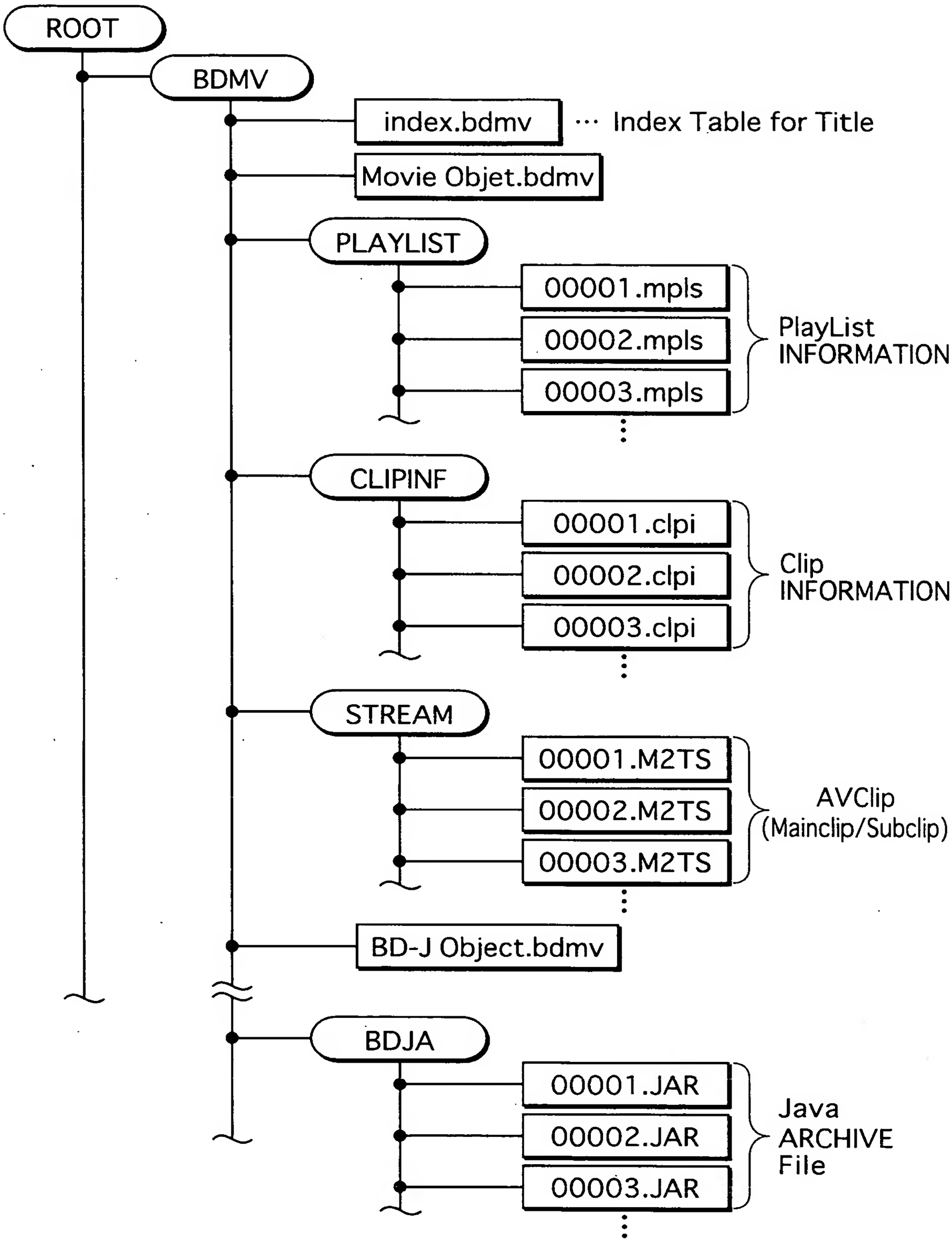
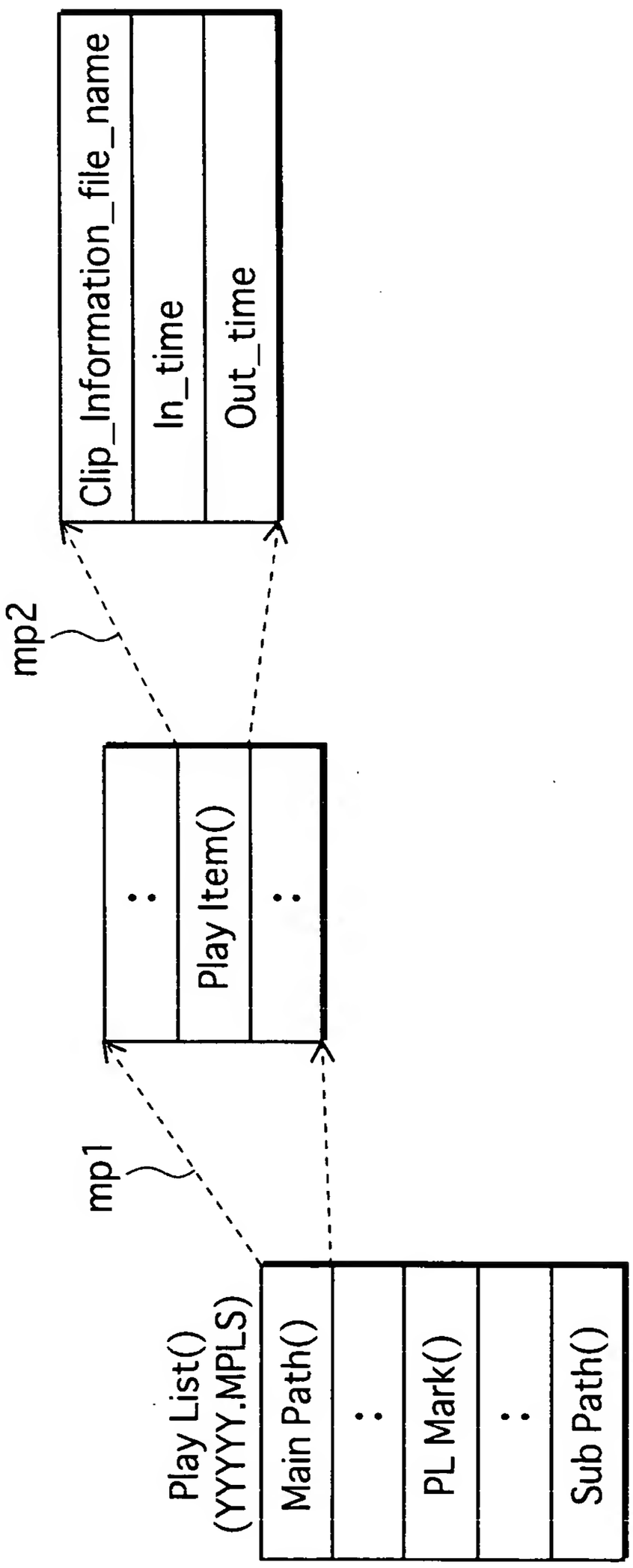

ROOT
BDMV
index.bdmv
··· Index Table for Title
Movie Objet.bdmv
PLAYLIST
00001.mpls
00002.mpls
00003.mpls
PlayList INFORMATION
CLIPINF
00001.clpi
00002.clpi
00003.clpi
Clip INFORMATION
STREAM
00001.M2TS
00002.M2TS
00003.M2TS
AVClip (Mainclip/Subclip)
BD-J Object.bdmv
BDJA
00001.JAR
00002.JAR
00003.JAR
Java ARCHIVE File

FIG.3


Clip_Information_file_name
In_time
Out_time
mp2
:
Play Item()
:
mp1
Play List()
(YYYYY.MPLS)
Main Path()
:
PL Mark()
:
Sub Path()

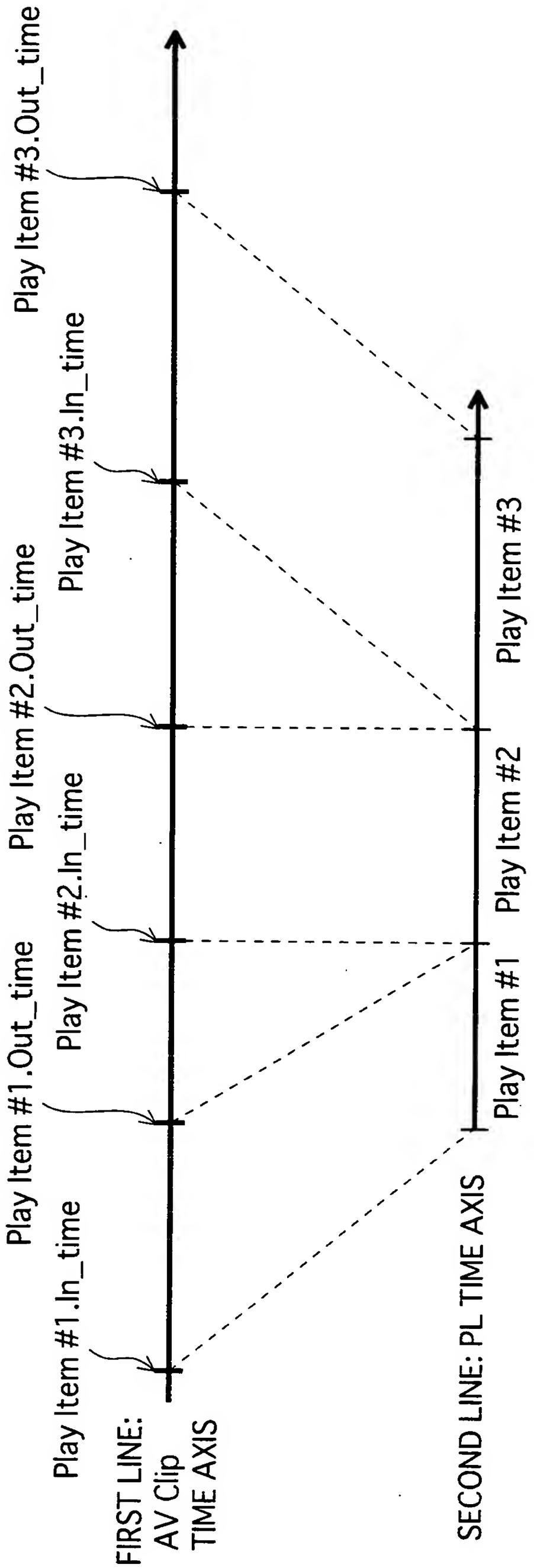

Play Item #3.Out_time
Play Item #3.In_time
Play Item #2.Out_time
Play Item #2.In_time
Play Item #1.Out_time
Play Item #1.In_time
Play Item #3
Play Item #2
Play Item #1
FIRST LINE:
AV Clip
TIME AXIS
SECOND LINE: PL TIME AXIS

FIG.4

FIG.5

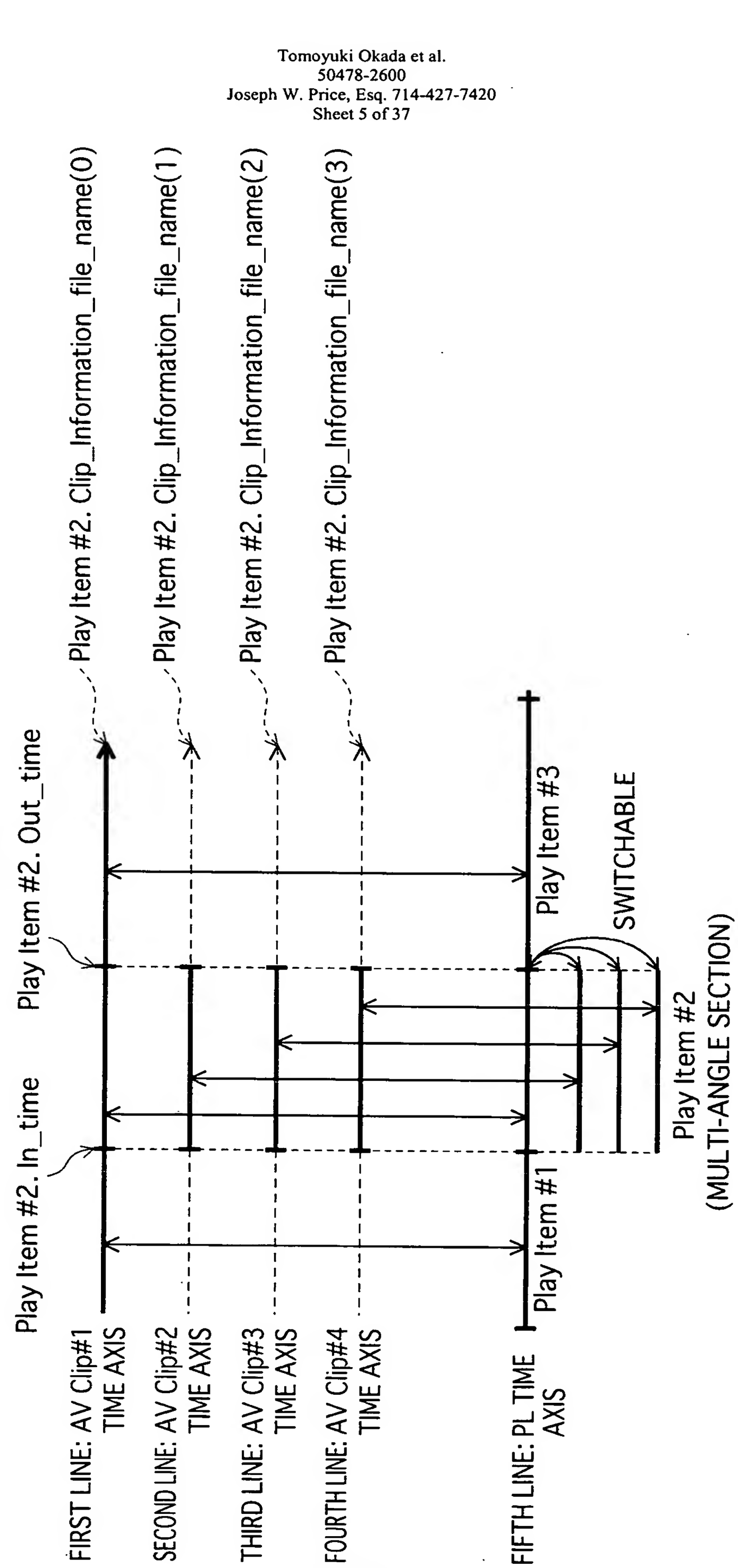

Play Item #2. Clip_Information_file_name(0)
Play Item #2. Clip_Information_file_name(1)
Play Item #2. Clip_Information_file_name(2)
Play Item #2. Clip_Information_file_name(3)
Play
Play
Play
Play
Play Item #2. Out_time
Play Item #2. In_time
Play Item #3
SWITCHABLE
Play Item #2
(MULTI-ANGLE SECTION)
Play Item #1
FIRST LINE: AV Clip#1 TIME AXIS
SECOND LINE: AV Clip#2 TIME AXIS
THIRD LINE: AV Clip#3 TIME AXIS
FOURTH LINE: AV Clip#4 TIME AXIS
FIFTH LINE: PL TIME AXIS

FIG.6

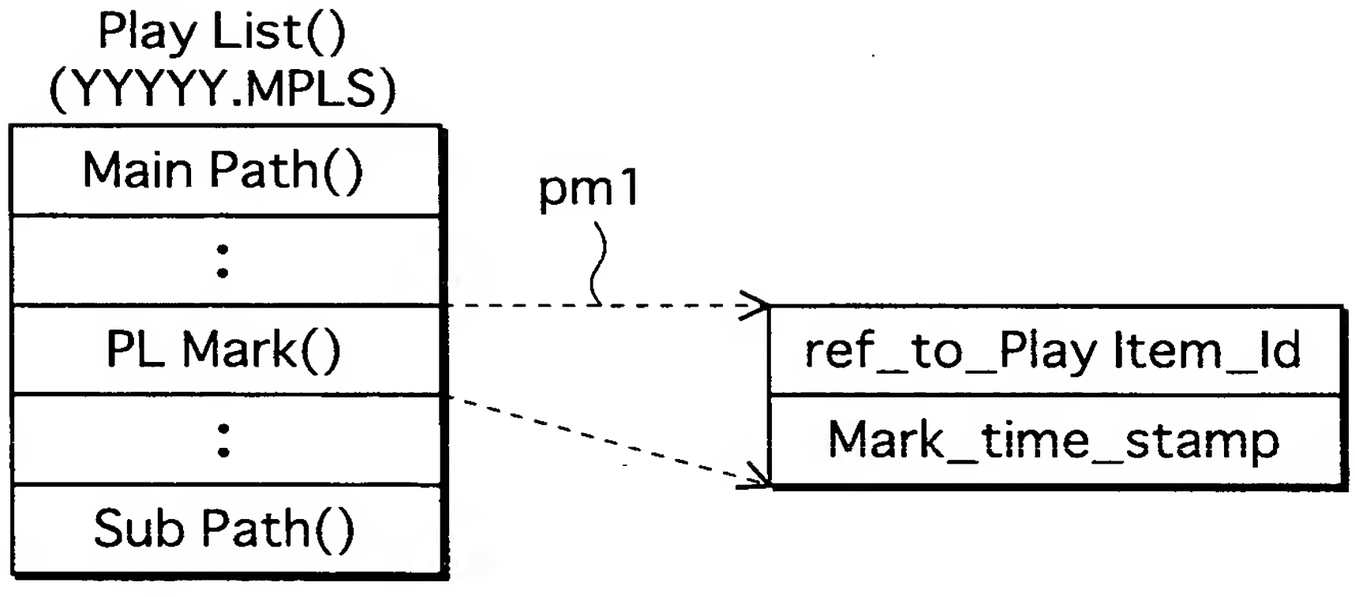
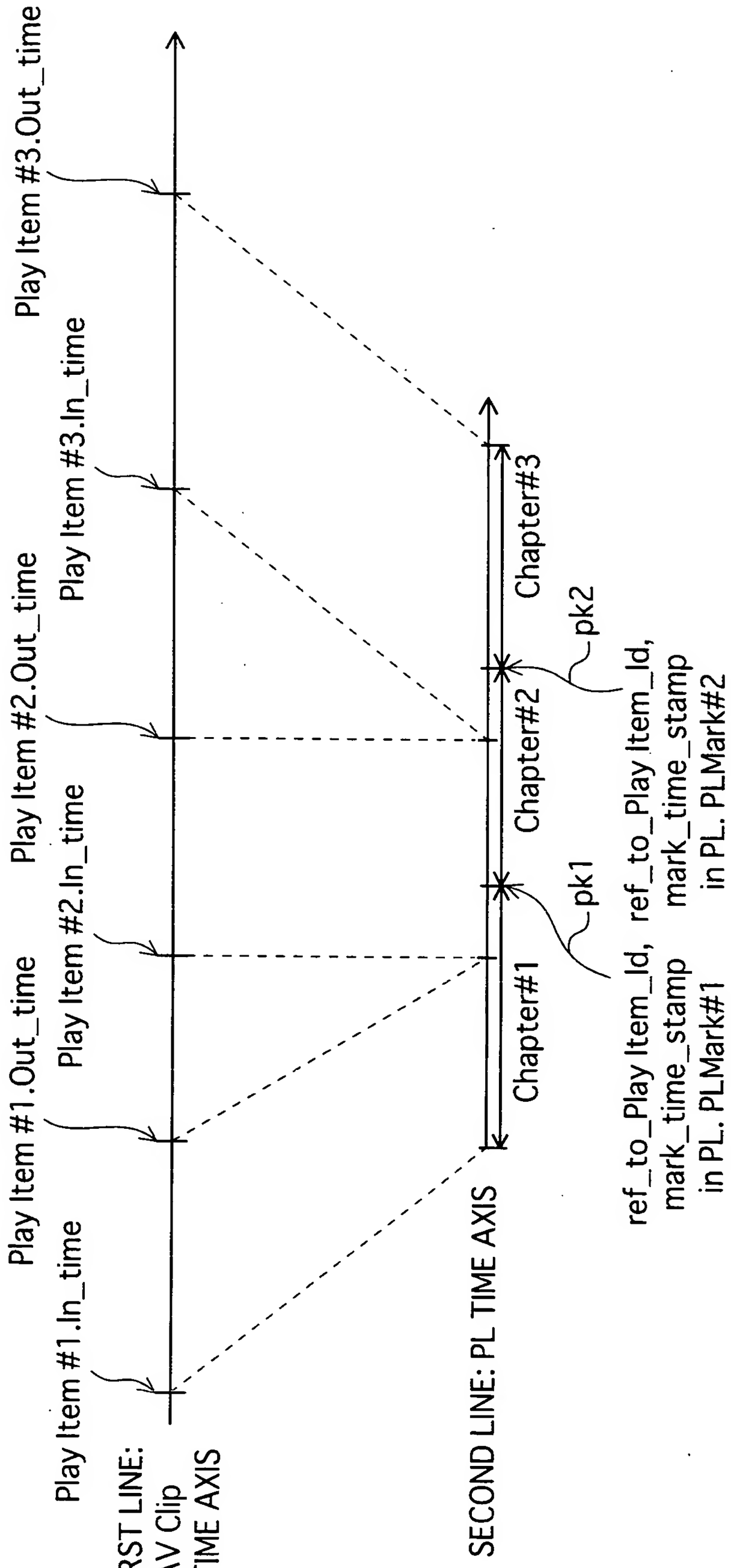

Play List()
(YYYYY.MPLS)
Main Path()
:
PL Mark()
:
Sub Path()
pm1
ref_to_Play Item_Id
Mark_time_stamp

FIG.7


Play Item #3.Out_time
Play Item #3.In_time
Play Item #2.Out_time
Play Item #2.In_time
Play Item #1.Out_time
Play Item #1.In_time
FIRST LINE:
AV Clip
TIME AXIS
SECOND LINE: PL TIME AXIS
Chapter#1
Chapter#2
Chapter#3
pk1
pk2
ref_to_Play Item_Id,
mark_time_stamp
in PL. PLMark#1
ref_to_Play Item_Id,
mark_time_stamp
in PL. PLMark#2

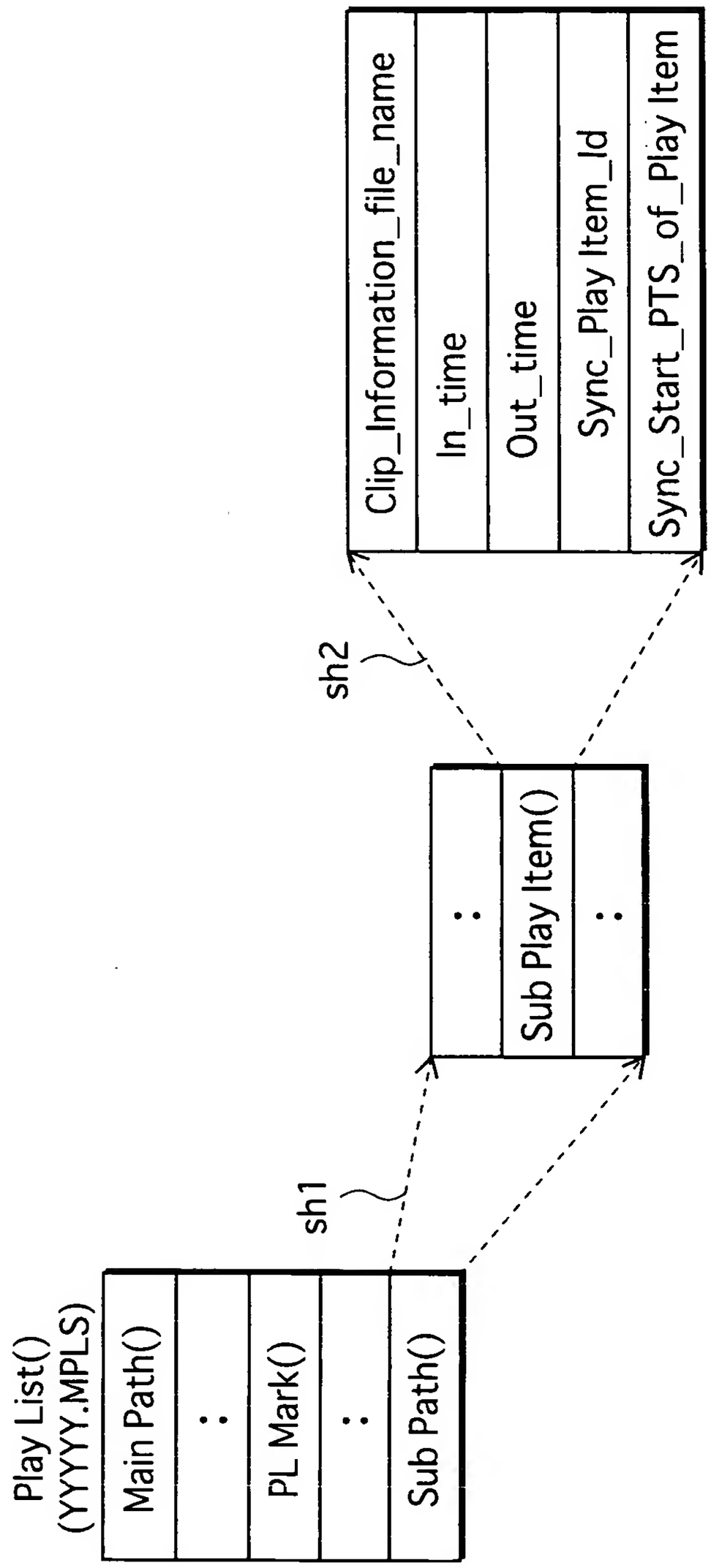

Play List()
(YYYYY.MPLS)
Main Path()
:
PL Mark()
:
Sub Path()
sh1
:
Sub Play Item()
:
sh2
Clip_Information_file_name
In_time
Out_time
Sync_Play Item_Id
Sync_Start_PTS_of_Play Item

FIG.8

FIG.9

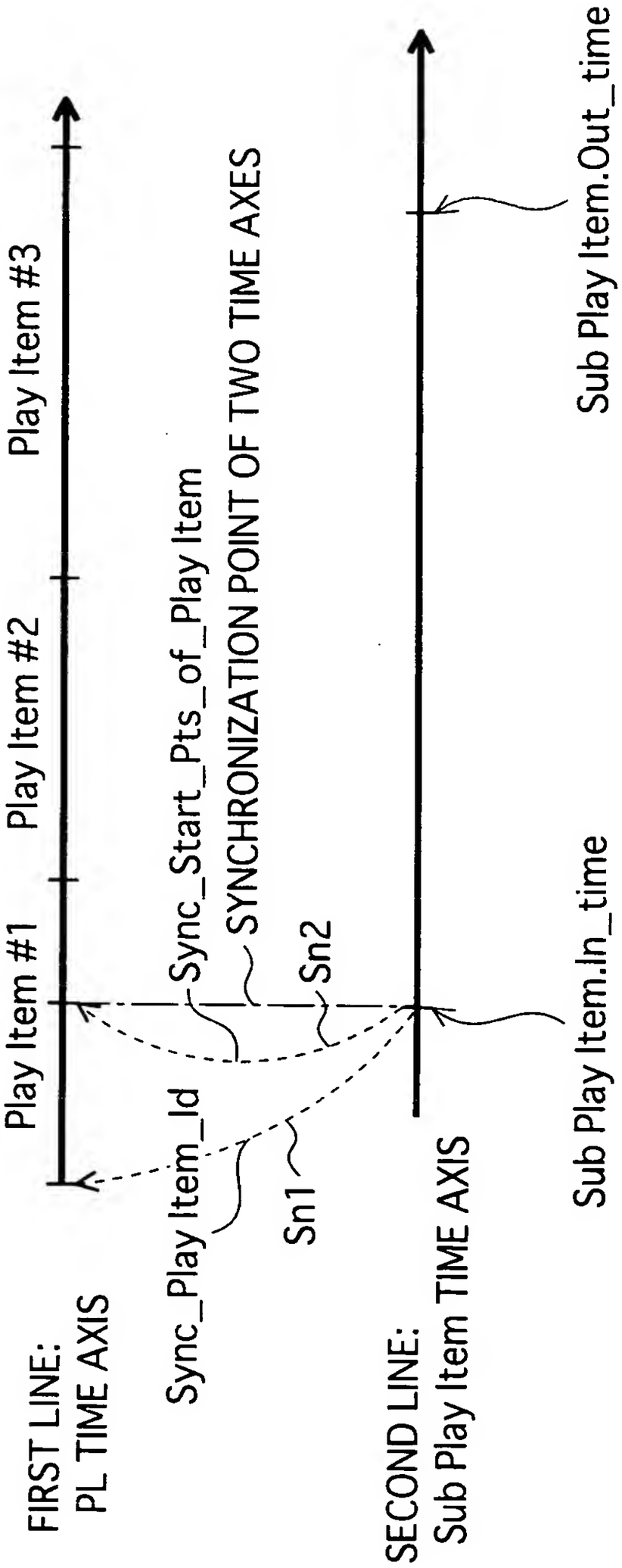

FIRST LINE:
PL TIME AXIS
Play Item #1
Play Item #2
Play Item #3
Sync_Start_Pts_of_Play Item
SYNCHRONIZATION POINT OF TWO TIME AXES
Sync_Play Item_Id
Sn1
Sn2
SECOND LINE:
Sub Play Item TIME AXIS
Sub Play Item.In_time
Sub Play Item.Out_time

FIG.10

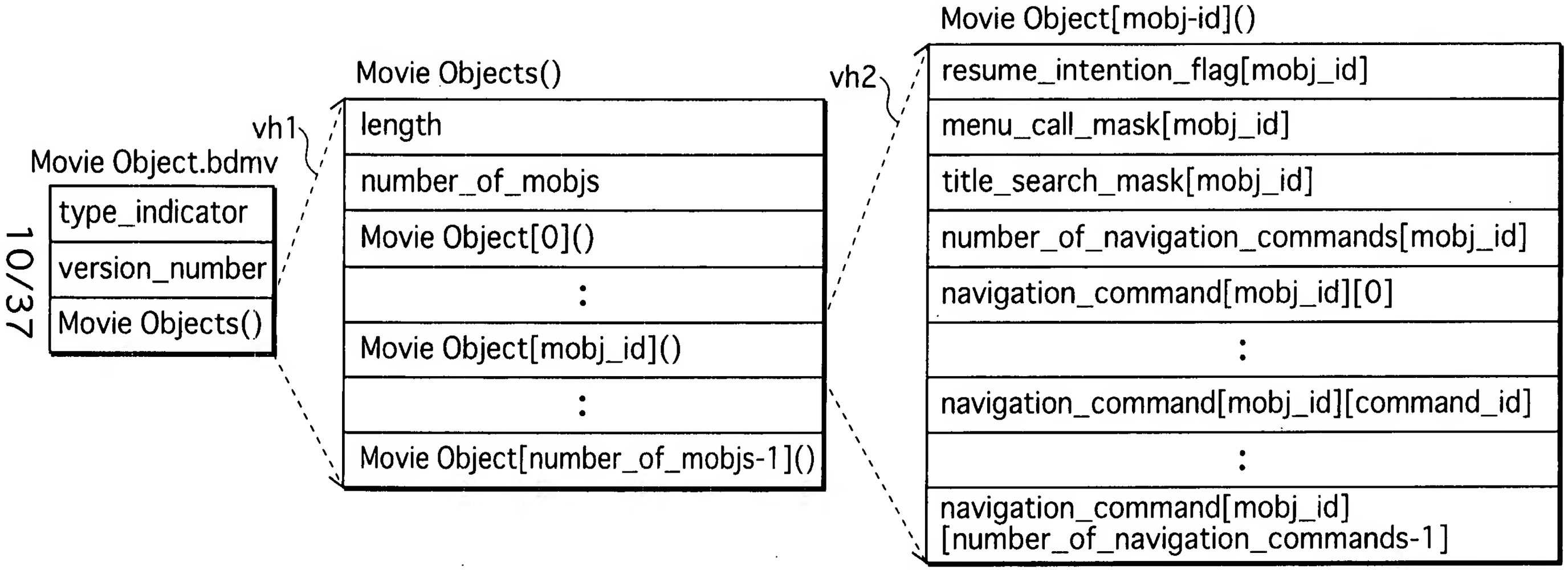


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FIG.11

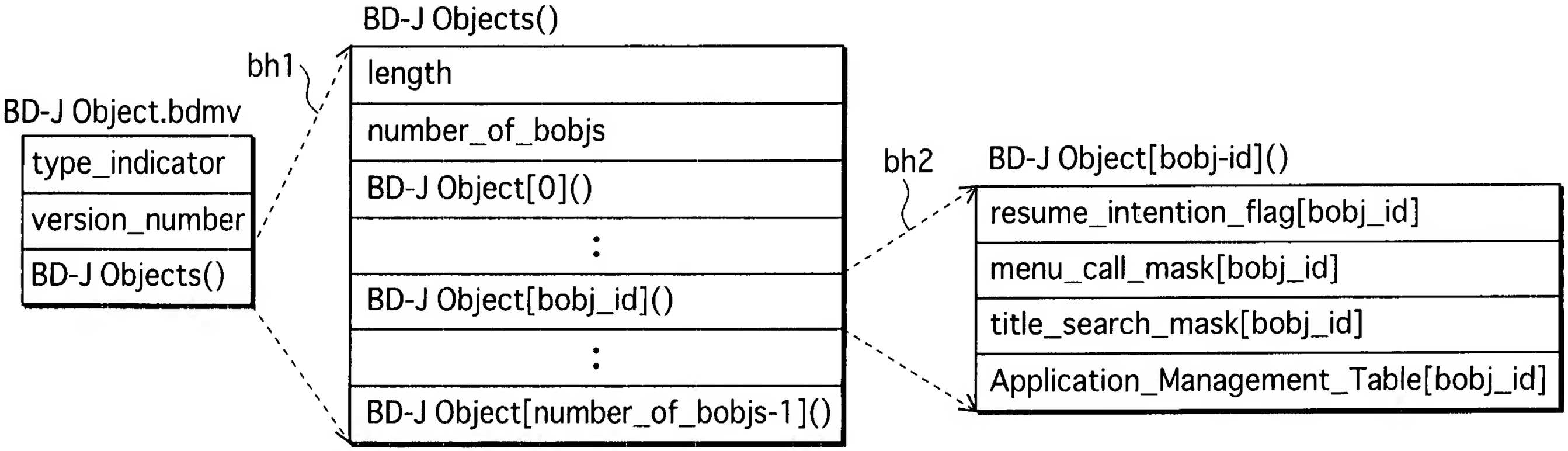

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FIG.12A

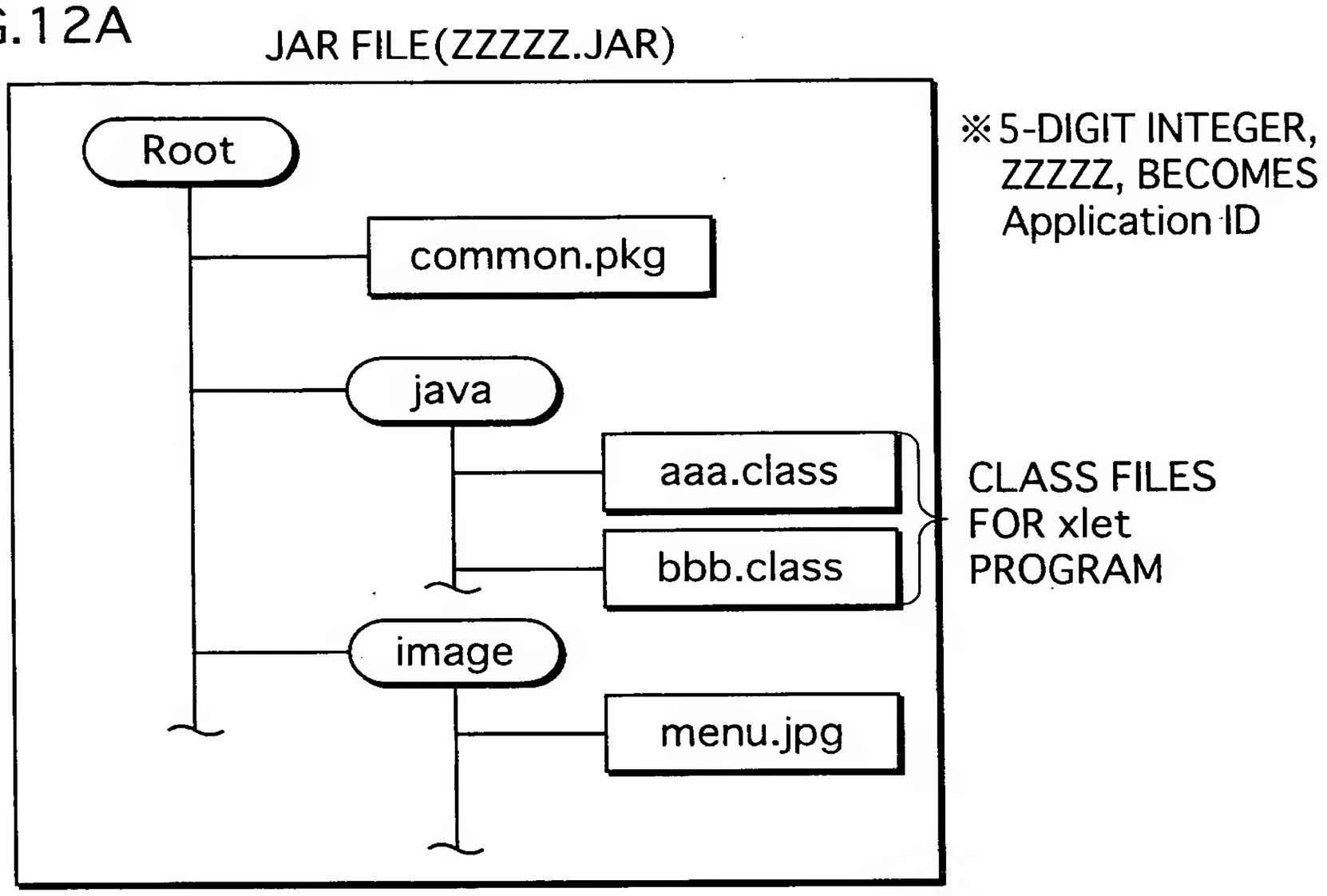

FIG.12B

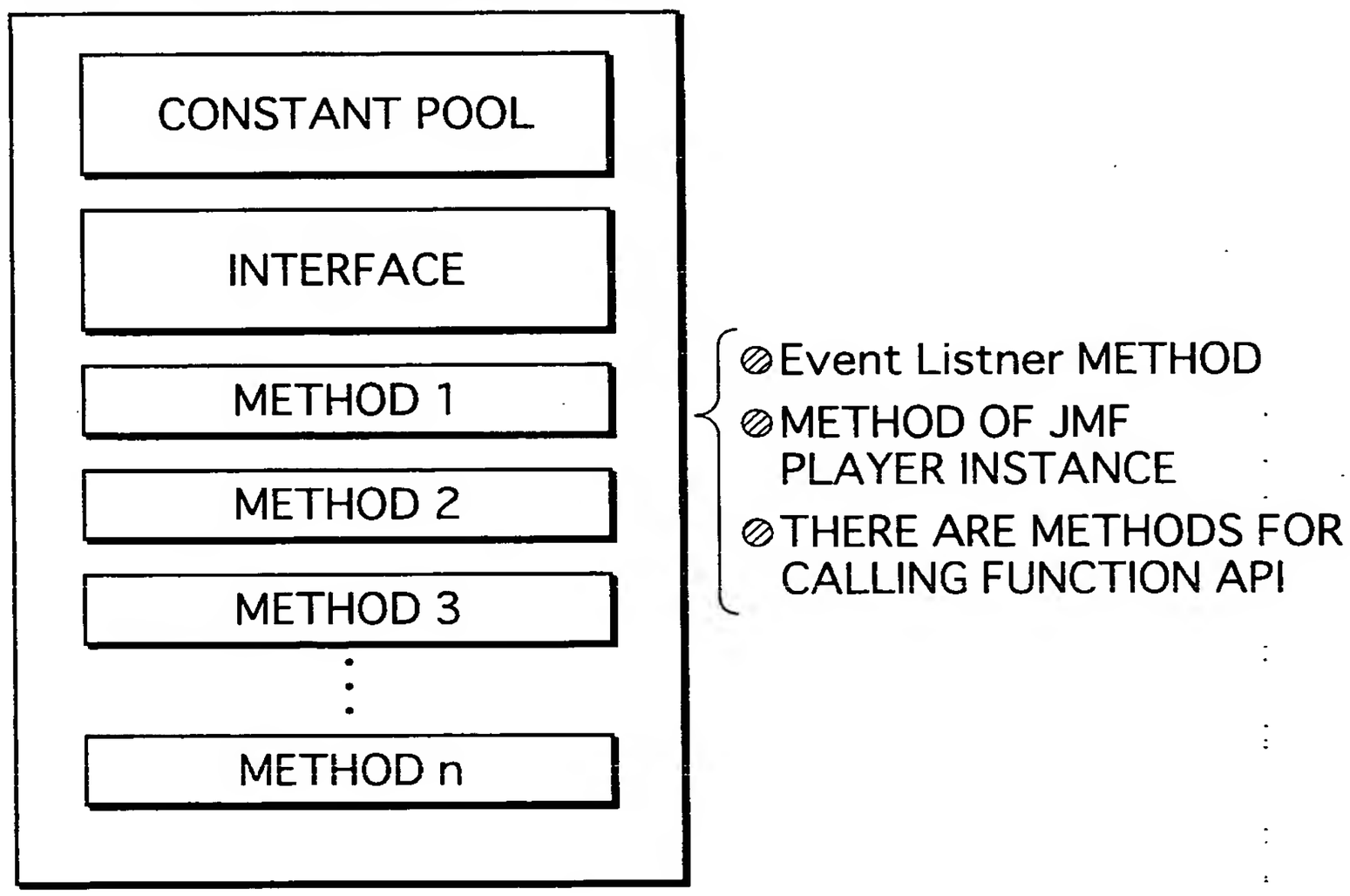

FIG.13

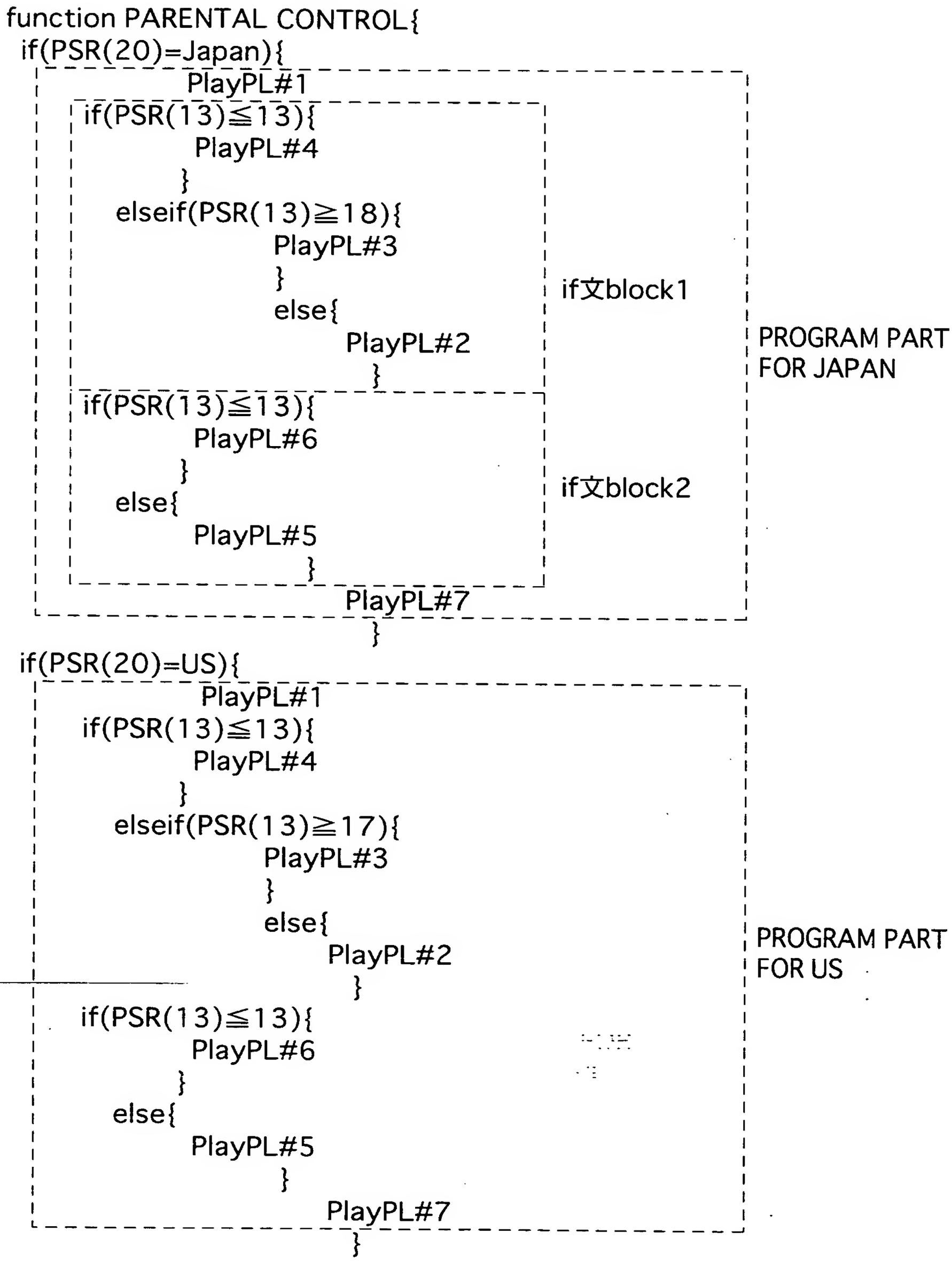
function PARENTAL CONTROL{
if(PSR(20)=Japan){
PlayPL#1
if(PSR(13)≦13){
PlayPL#4
}
elseif(PSR(13)≧18){
PlayPL#3
}
else{
PlayPL#2
}
if文block1
if(PSR(13)≦13){
PlayPL#6
}
else{
PlayPL#5
}
if文block2
PlayPL#7
}
PROGRAM PART FOR JAPAN
if(PSR(20)=US){
PlayPL#1
if(PSR(13)≦13){
PlayPL#4
}
elseif(PSR(13)≧17){
PlayPL#3
}
else{
PlayPL#2
}
if(PSR(13)≦13){
PlayPL#6
}
else{
PlayPL#5
}
PlayPL#7
}
PROGRAM PART FOR US

FIG.14A

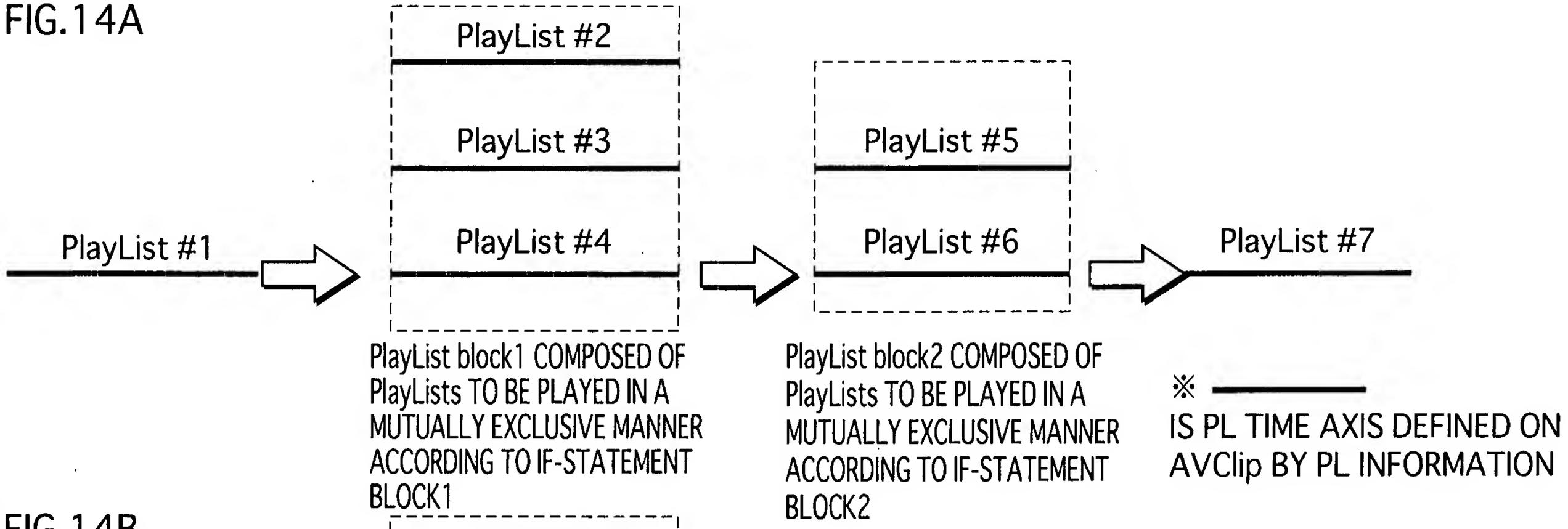

FIG.14B

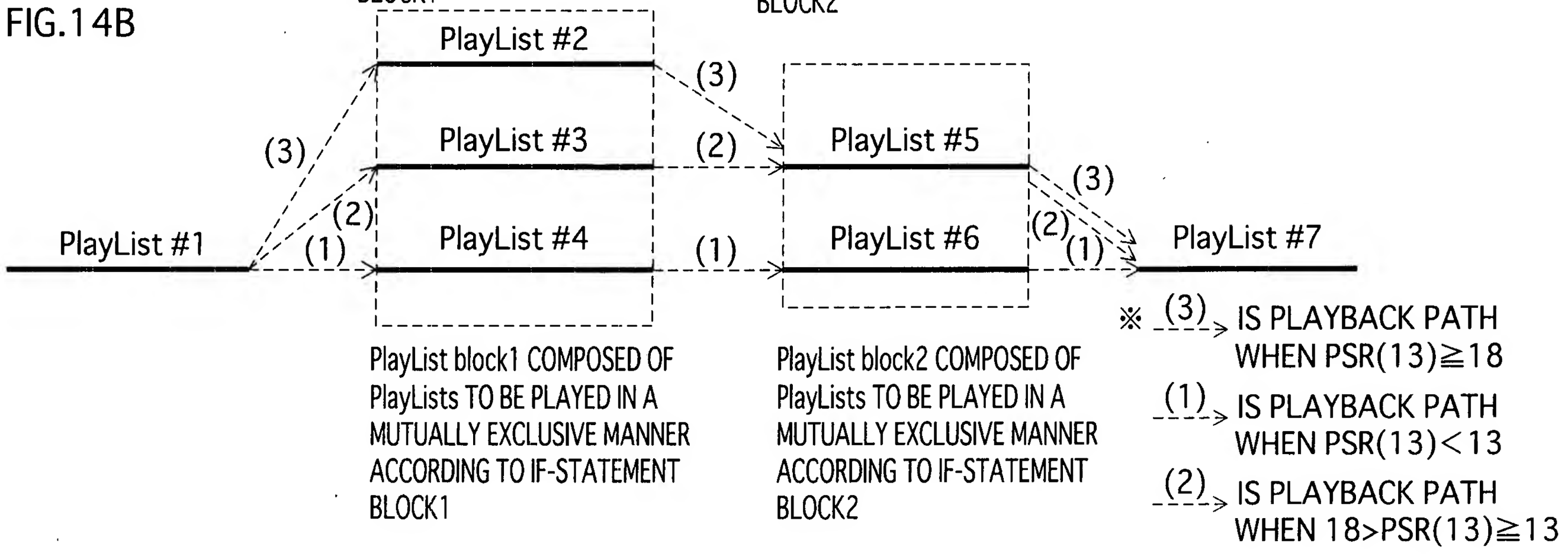

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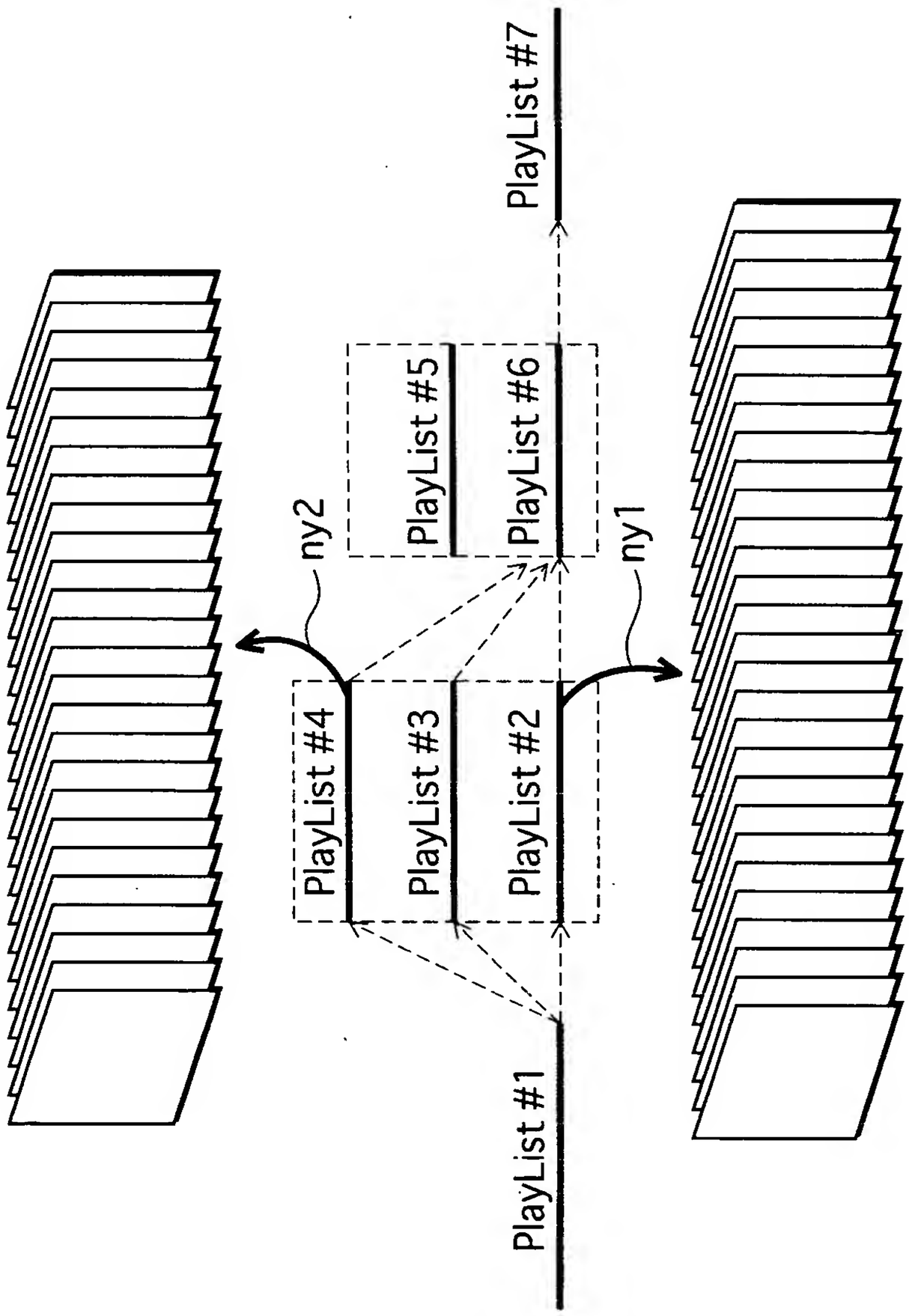
FIG.15


PlayList #7
PlayList #5
PlayList #6
ny2
ny1
PlayList #4
PlayList #3
PlayList #2
PlayList #1

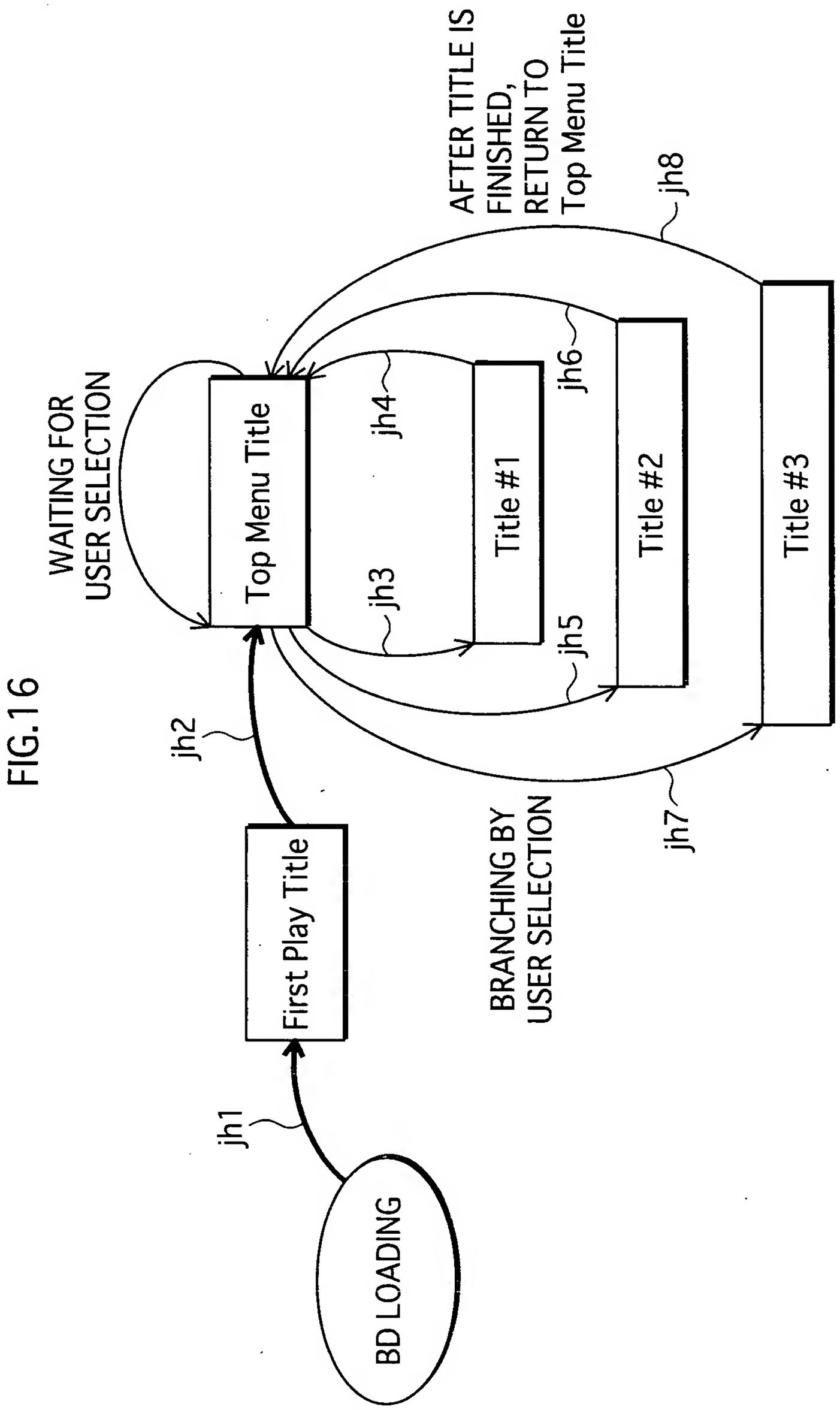

BD LOADING
jh1
First Play Title
jh2
WAITING FOR USER SELECTION
Top Menu Title
jh3
jh4
Title #1
BRANCHING BY USER SELECTION
jh5
Title #2
jh6
Title #3
jh7
jh8
AFTER TITLE IS FINISHED, RETURN TO Top Menu Title

FIG.16

FIG.17

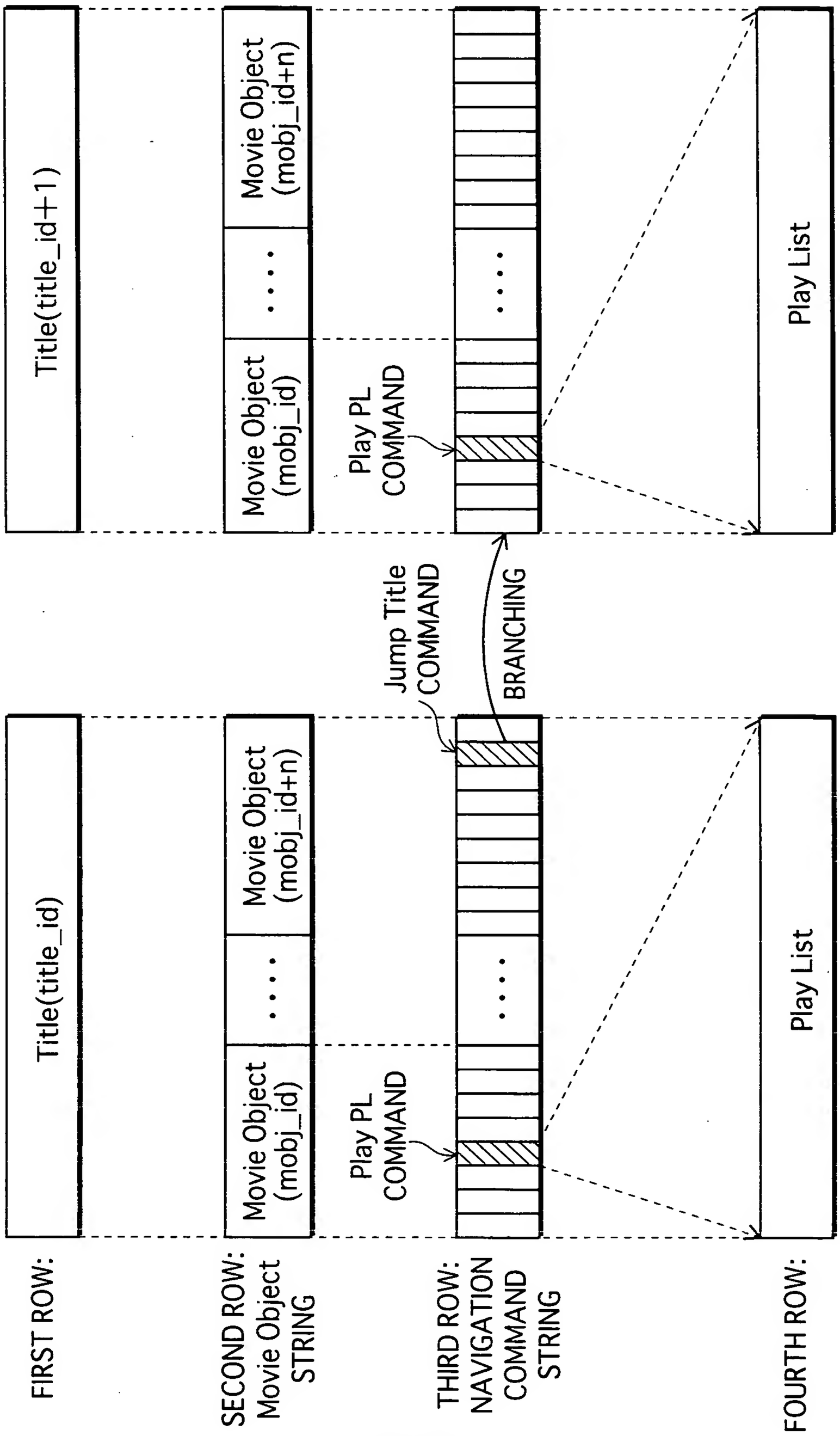

FIRST ROW:
Title(title_id)
Title(title_id+1)
SECOND ROW:
Movie Object
STRING
Movie Object
(mobj_id)
Movie Object
(mobj_id+n)
THIRD ROW:
NAVIGATION
COMMAND
STRING
Play PL
COMMAND
Jump Title
COMMAND
BRANCHING
FOURTH ROW:
Play List
Play List

FIG.18

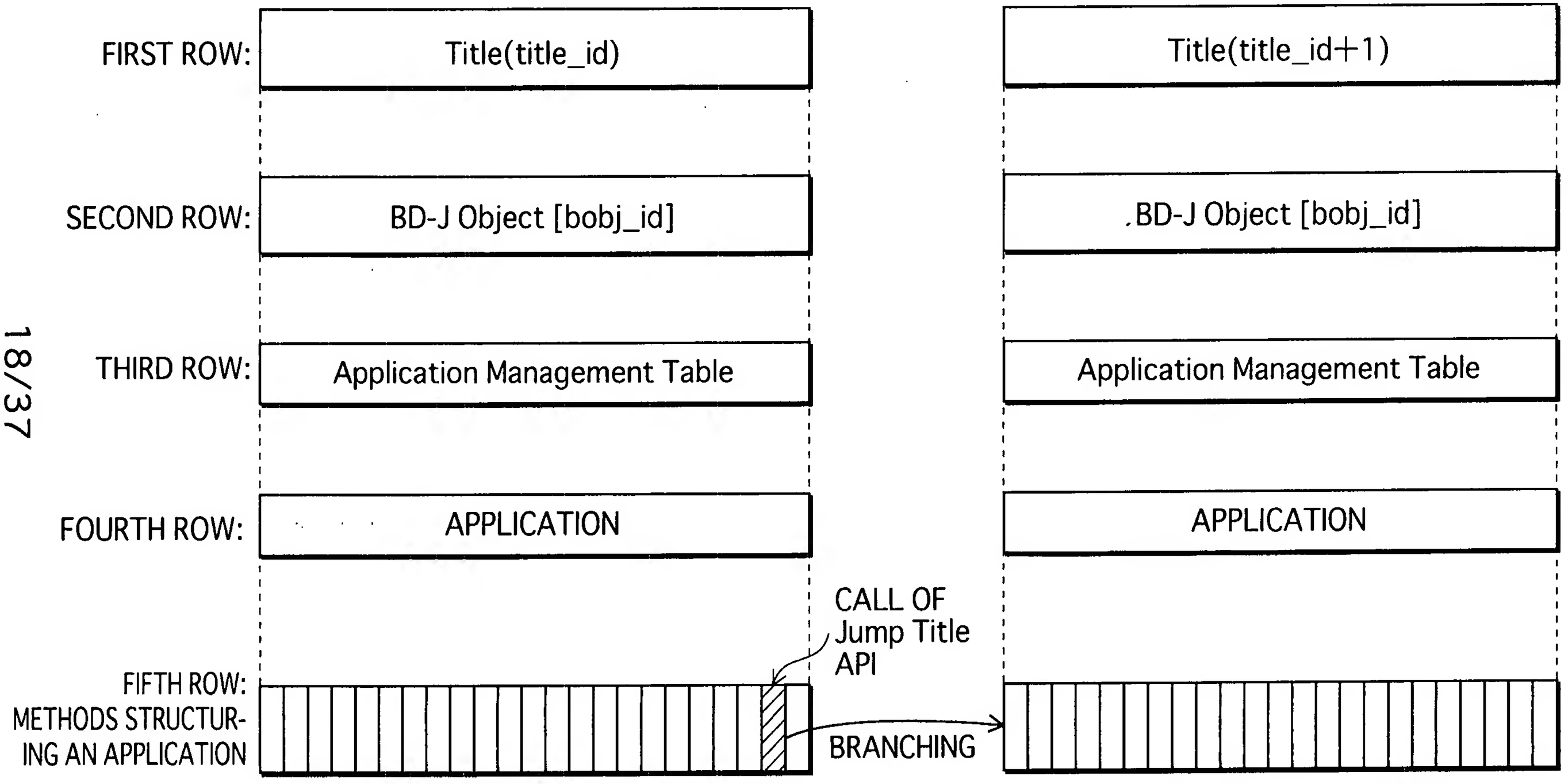


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FIG.19

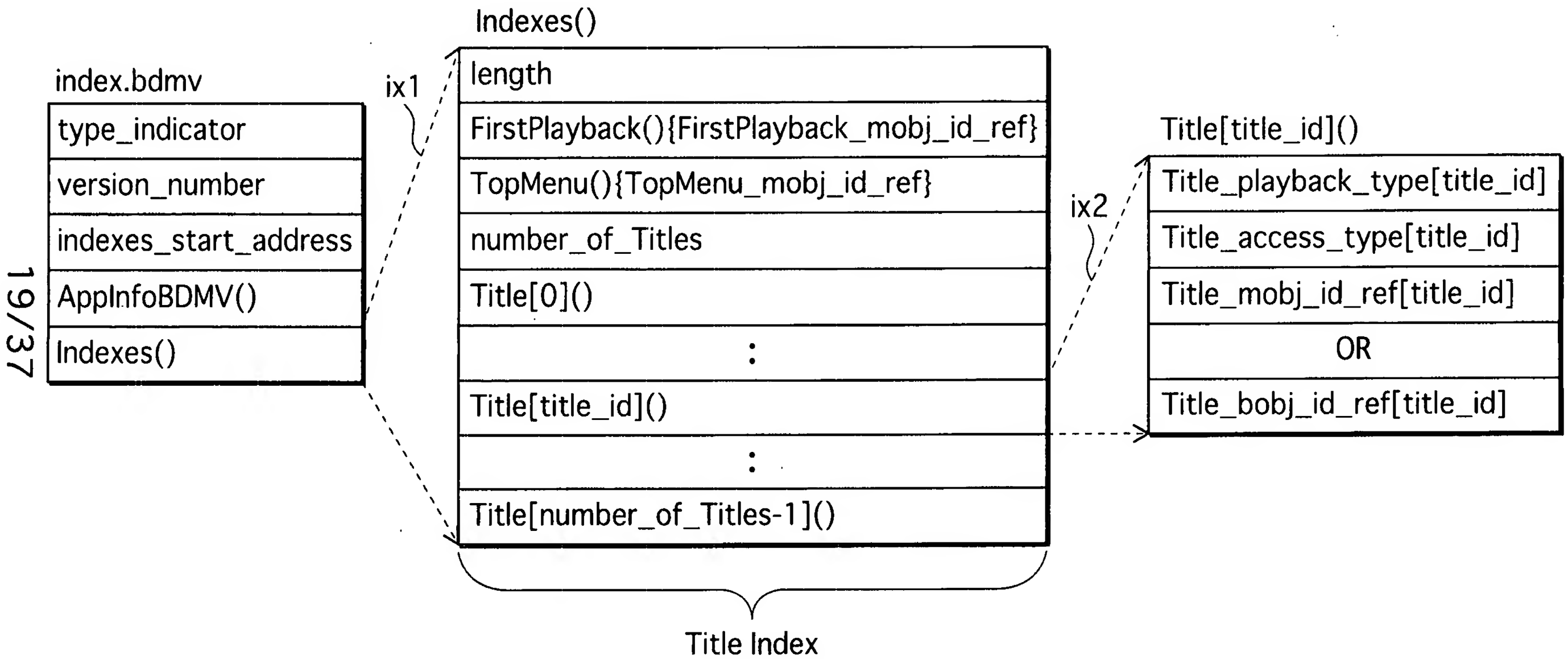

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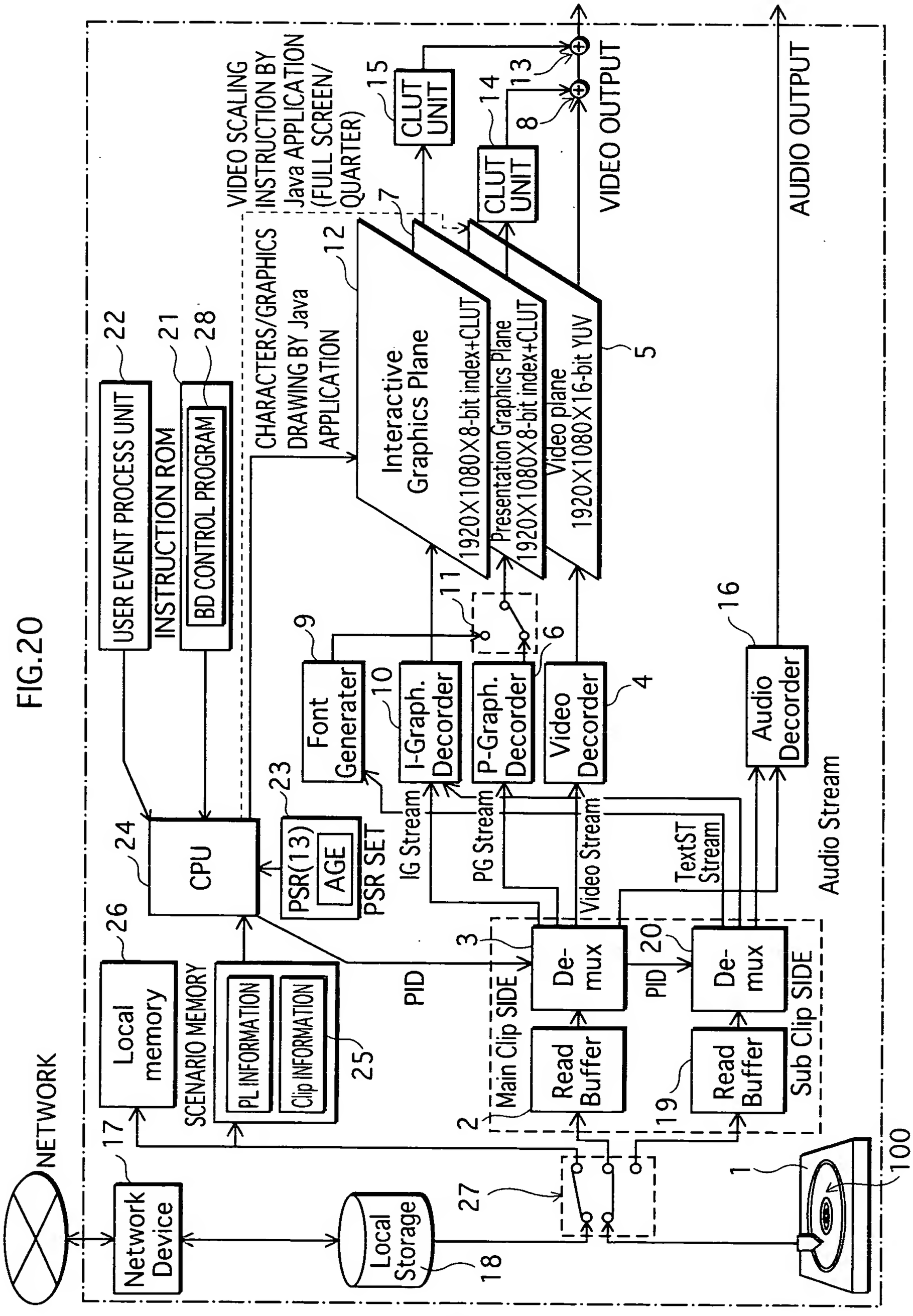
FIG.20


NETWORK
Network Device
Local Storage
18
17
Local memory
22
SCENARIO MEMORY
PL INFORMATION
Clip INFORMATION
25
21
28
BD CONTROL PROGRAM
USER EVENT PROCESS UNIT
INSTRUCTION ROM
CPU
24
26
PSR(13)
AGE
PSR SET
23
VIDEO SCALING INSTRUCTION BY Java APPLICATION (FULL SCREEN/ QUARTER)
CHARACTERS/GRAPHICS DRAWING BY Java APPLICATION
12
7
Font Generater
10
9
I-Graph. Decorder
11
P-Graph. Decorder
6
Video Decorder
4
Interactive Graphics Plane
1920X1080X8-bit index+CLUT
Presentation Graphics Plane
1920X1080X8-bit index+CLUT
Video plane
1920X1080X16-bit YUV
5
CLUT UNIT
15
CLUT UNIT
14
8
13
VIDEO OUTPUT
AUDIO OUTPUT
IG Stream
PG Stream
Video Stream
TextST Stream
Audio Stream
16
Audio Decorder
PID
3
De-mux
PID
20
De-mux
Main Clip SIDE
Sub Clip SIDE
2
Read Buffer
19
Read Buffer
27
1
100

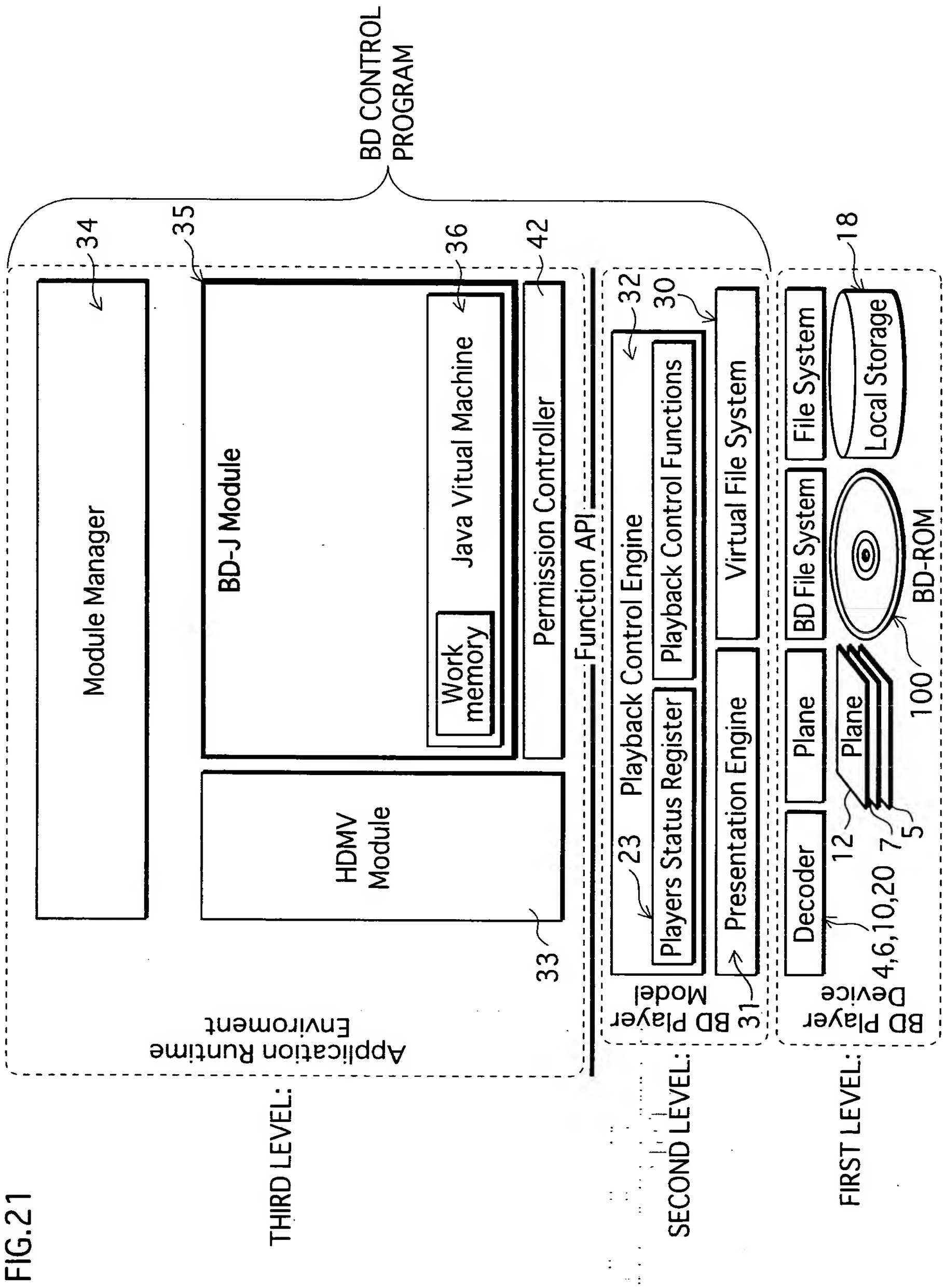
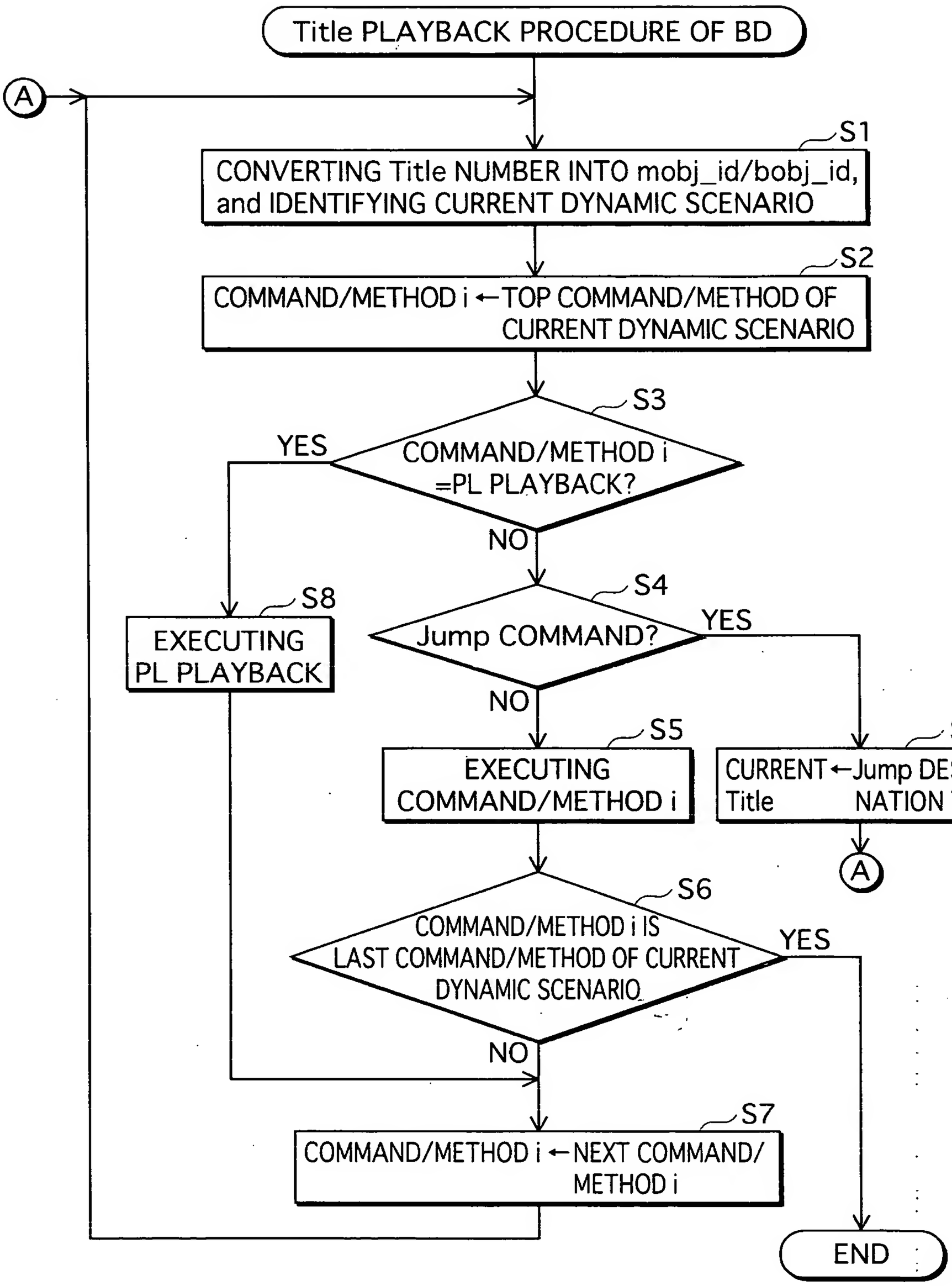

BD CONTROL PROGRAM
34
35
36
42
32
30
18
Module Manager
BD-J Module
Java Vitual Machine
Work memory
Permission Controller
HDMV Module
33
Function API
23
Playback Control Engine
Players Status Register
Playback Control Functions
Presentation Engine
Virtual File System
Decoder
Plane
Plane
12
4,6,10,20
7
5
BD File System
100
BD-ROM
File System
Local Storage
Application Runtime Environment
BD Player Model
31
BD Player Device
THIRD LEVEL:
SECOND LEVEL:
FIRST LEVEL:

FIG.21

FIG.22


Title PLAYBACK PROCEDURE OF BD
A
S1
CONVERTING Title NUMBER INTO mobj_id/bobj_id, and IDENTIFYING CURRENT DYNAMIC SCENARIO
S2
COMMAND/METHOD i ←TOP COMMAND/METHOD OF CURRENT DYNAMIC SCENARIO
S3
COMMAND/METHOD i =PL PLAYBACK?
YES
NO
S4
Jump COMMAND?
YES
NO
S8
EXECUTING PL PLAYBACK
S5
EXECUTING COMMAND/METHOD i
S9
CURRENT Title ←Jump DESTINATION Title
A
S6
COMMAND/METHOD i IS LAST COMMAND/METHOD OF CURRENT DYNAMIC SCENARIO
YES
NO
S7
COMMAND/METHOD i ←NEXT COMMAND/METHOD i
END

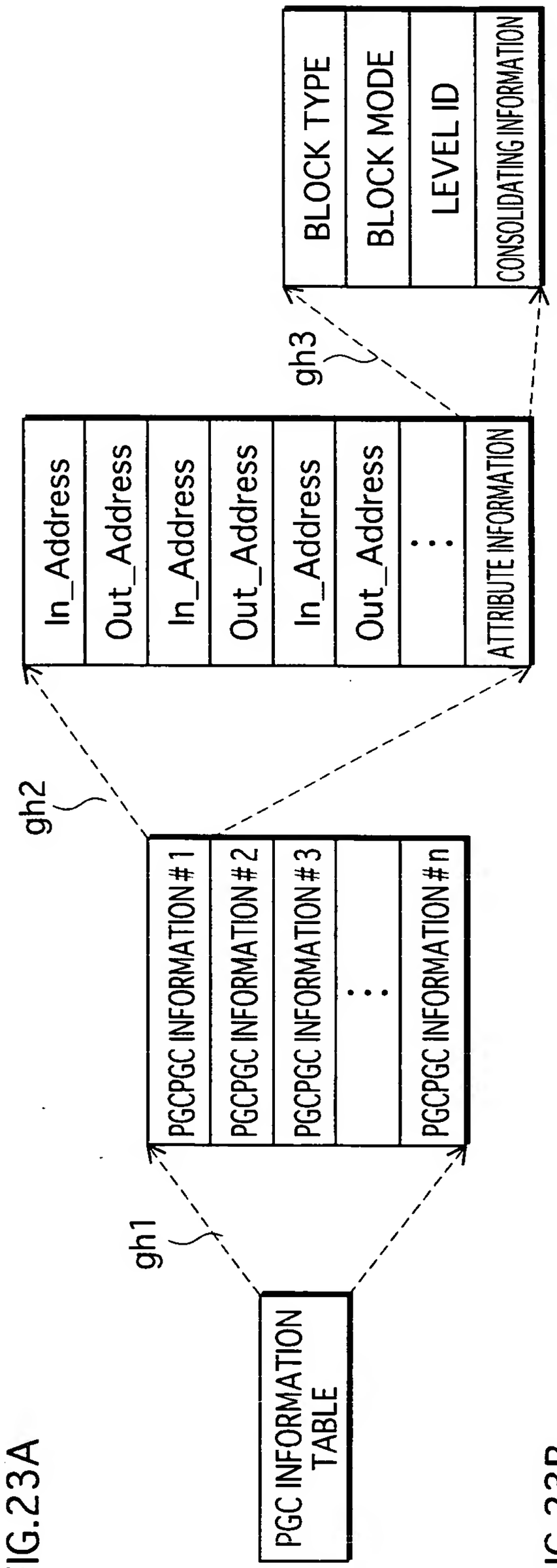
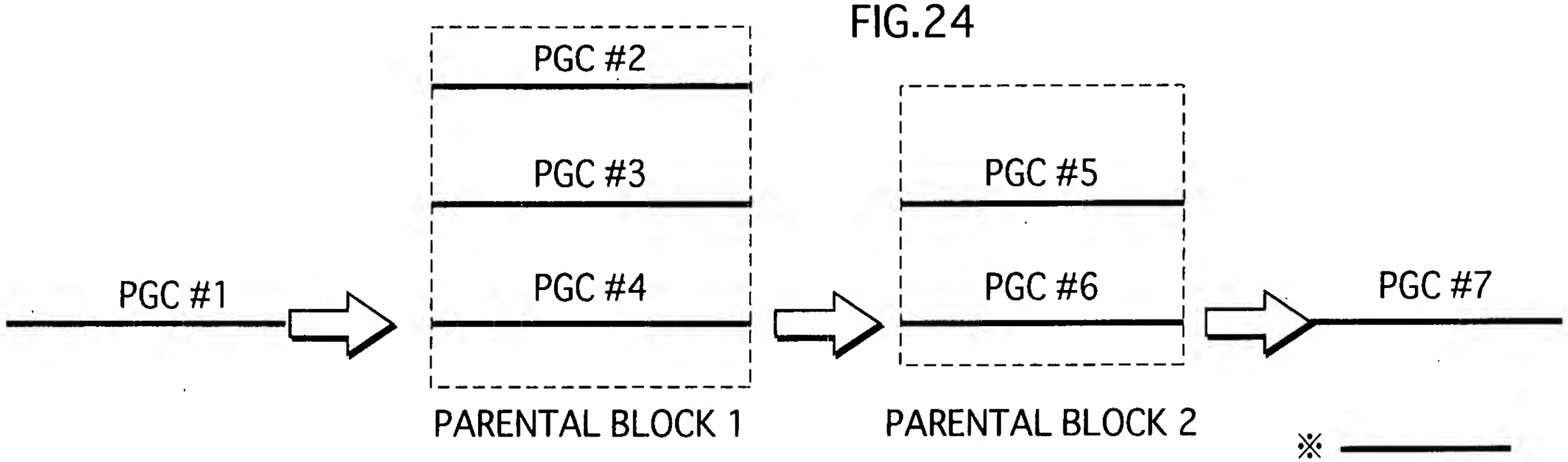


FIG.23A

FIG.23B

	BLOCK TYPE	BLOCK MODE	LEVEL ID	CONSOLIDATING INFORMATION
PGC INFORMATION #1	NONPARENTAL BLOCK	null	L8	PGC # 4
PGC INFORMATION #2	PARENTAL BLOCK	TOP	L2(UNDER THE AGE OF 18 PROHIBITED)	PGC # 6(TEMP)
PGC INFORMATION #3	PARENTAL BLOCK	MIDDLE	L5(UNDER THE AGE OF 15 PROHIBITED)	PGC # 6(TEMP)
PGC INFORMATION #4	PARENTAL BLOCK	LAST	L8(G-RATED)	PGC # 6(TEMP)
PGC INFORMATION #5	PARENTAL BLOCK	TOP	L5(UNDER THE AGE OF 15 PROHIBITED)	PGC # 7(TEMP)
PGC INFORMATION #6	PARENTAL BLOCK	LAST	L8(G-RATED)	PGC # 7(TEMP)
PGC INFORMATION #7	NONPARENTAL BLOCK	null	L8	— —

FIG.24



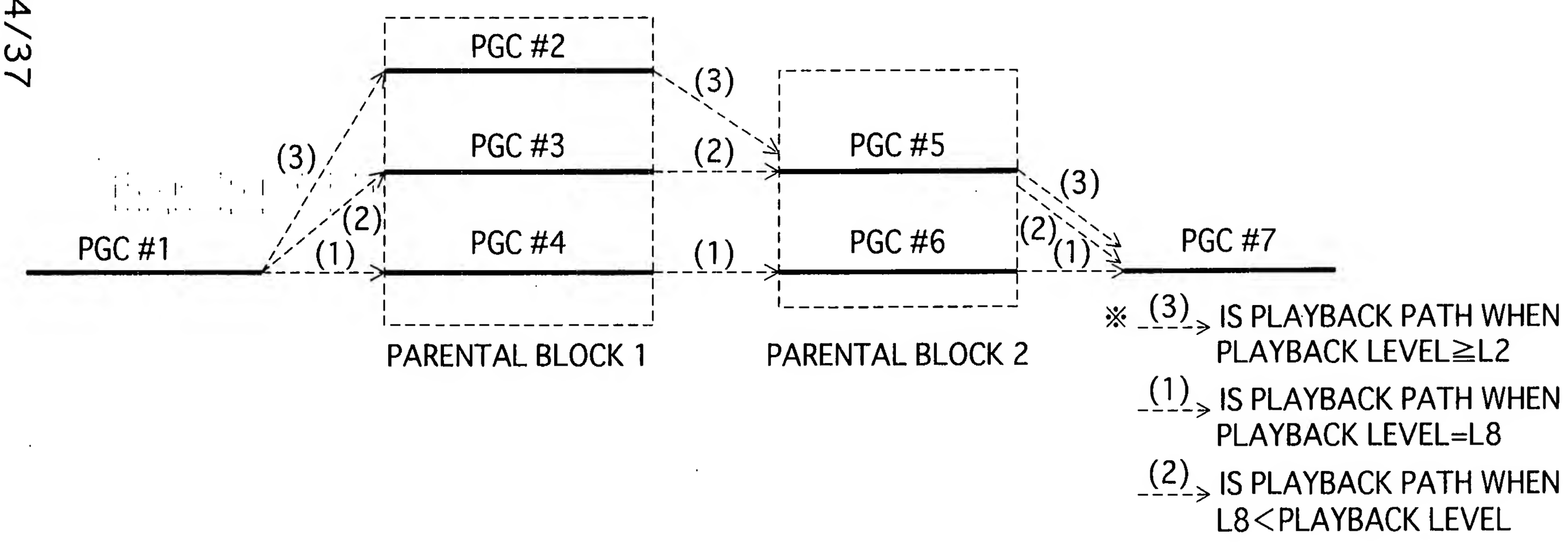


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FIG.25

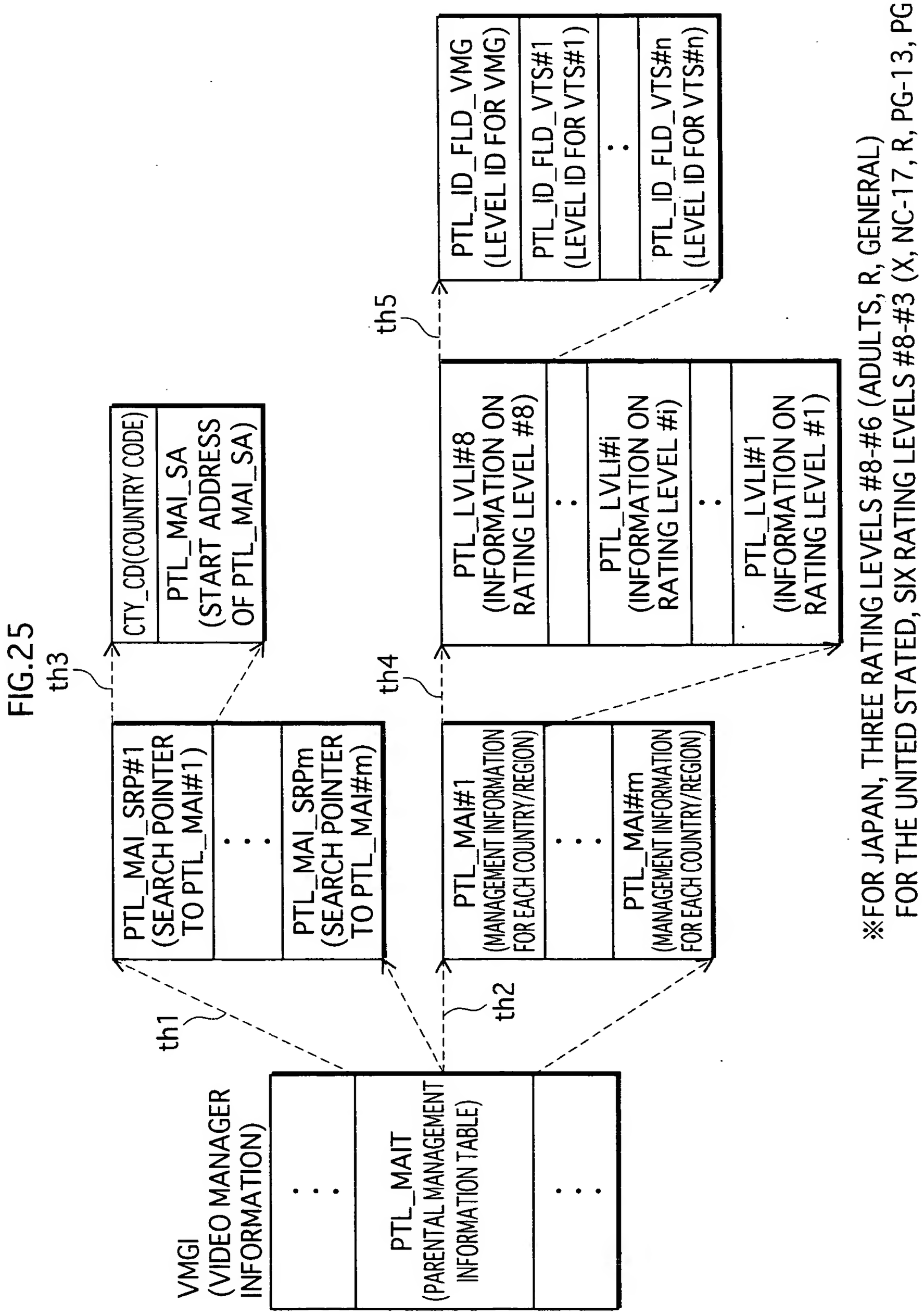
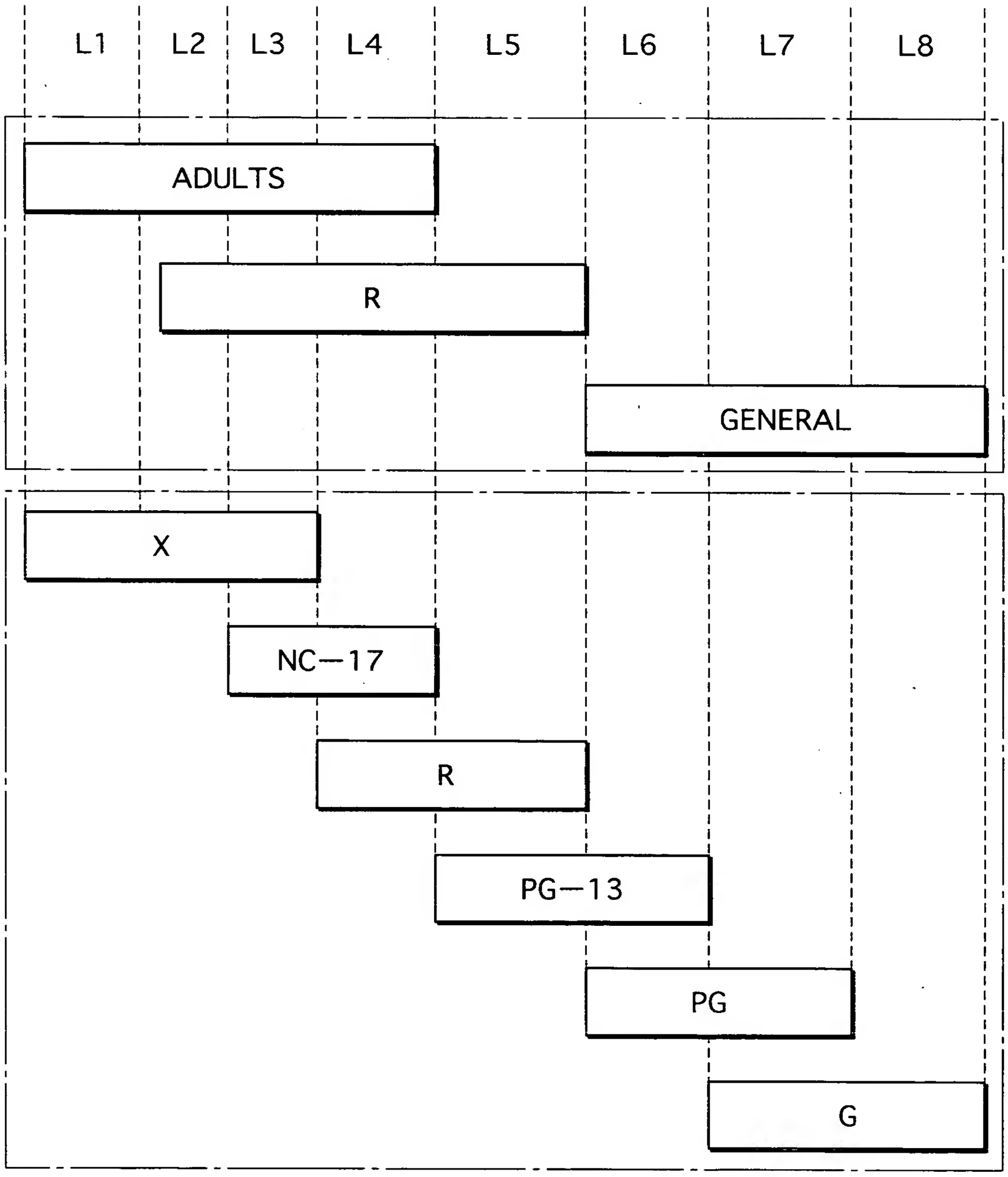

PTL_ID_FLD_VMG (LEVEL ID FOR VMG)
PTL_ID_FLD_VTS#1 (LEVEL ID FOR VTS#1)
PTL_ID_FLD_VTS#n (LEVEL ID FOR VTS#n)
th5
CTY_CD(COUNTRY CODE)
PTL_MAI_SA (START ADDRESS OF PTL_MAI_SA)
th3
PTL_MAI_SRP#1 (SEARCH POINTER TO PTL_MAI#1)
PTL_MAI_SRPm (SEARCH POINTER TO PTL_MAI#m)
PTL_LVLI#8 (INFORMATION ON RATING LEVEL #8)
PTL_LVLI#i (INFORMATION ON RATING LEVEL #i)
PTL_LVLI#1 (INFORMATION ON RATING LEVEL #1)
th4
PTL_MAI#1 (MANAGEMENT INFORMATION FOR EACH COUNTRY/REGION)
PTL_MAI#m (MANAGEMENT INFORMATION FOR EACH COUNTRY/REGION)
th2
th1
VMGI (VIDEO MANAGER INFORMATION)
PTL_MAIT (PARENTAL MANAGEMENT INFORMATION TABLE)
※FOR JAPAN, THREE RATING LEVELS #8-#6 (ADULTS, R, GENERAL)
FOR THE UNITED STATED, SIX RATING LEVELS #8-#3 (X, NC-17, R, PG-13, PG, G)

FIG.26



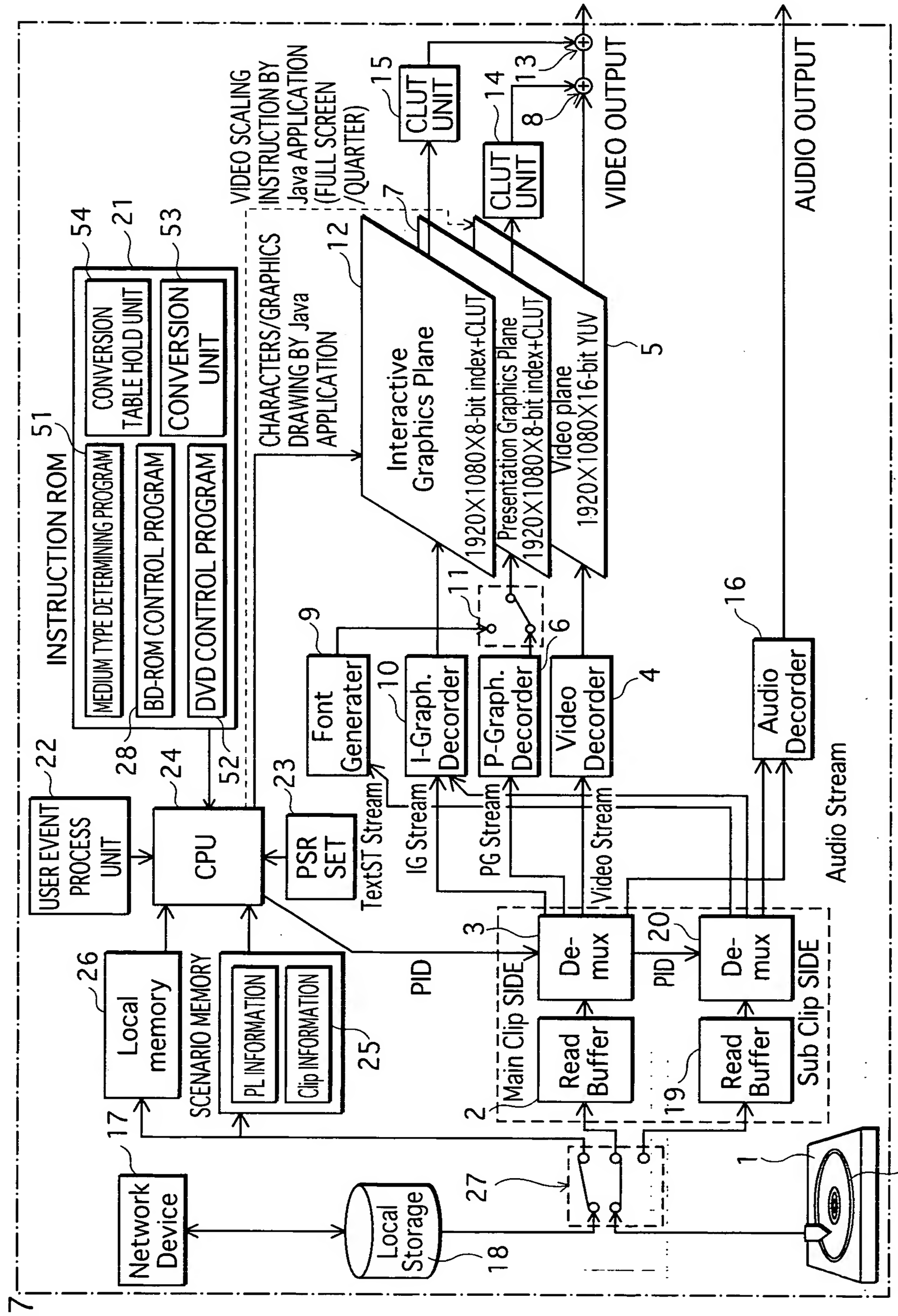

BD-ROM OR DVD-Video
1
Network Device
17
Local Storage
18
27
Local memory
26
SCENARIO MEMORY
PL INFORMATION
Clip INFORMATION
25
PID
Main Clip SIDE
2
De-mux
3
Read Buffer
Sub Clip SIDE
19
PID
20
De-mux
Read Buffer
Audio Stream
Audio Decorder
16
Video Stream
Video Decorder
4
PG Stream
P-Graph. Decorder
6
IG Stream
I-Graph. Decorder
10
TextST Stream
Font Generater
9
11
8
PSR SET
23
CPU
24
USER EVENT PROCESS UNIT
22
28
52
INSTRUCTION ROM
51
MEDIUM TYPE DETERMINING PROGRAM
BD-ROM CONTROL PROGRAM
DVD CONTROL PROGRAM
CONVERSION TABLE HOLD UNIT
54
CONVERSION UNIT
21
53
CHARACTERS/GRAPHICS DRAWING BY Java APPLICATION
12
VIDEO SCALING INSTRUCTION BY Java APPLICATION (FULL SCREEN /QUARTER)
7
Interactive Graphics Plane
1920X1080X8-bit index+CLUT
Presentation Graphics Plane
1920X1080X8-bit index+CLUT
Video plane
1920X1080X16-bit YUV
5
CLUT UNIT
15
CLUT UNIT
14
8
13
VIDEO OUTPUT
AUDIO OUTPUT

FIG.27

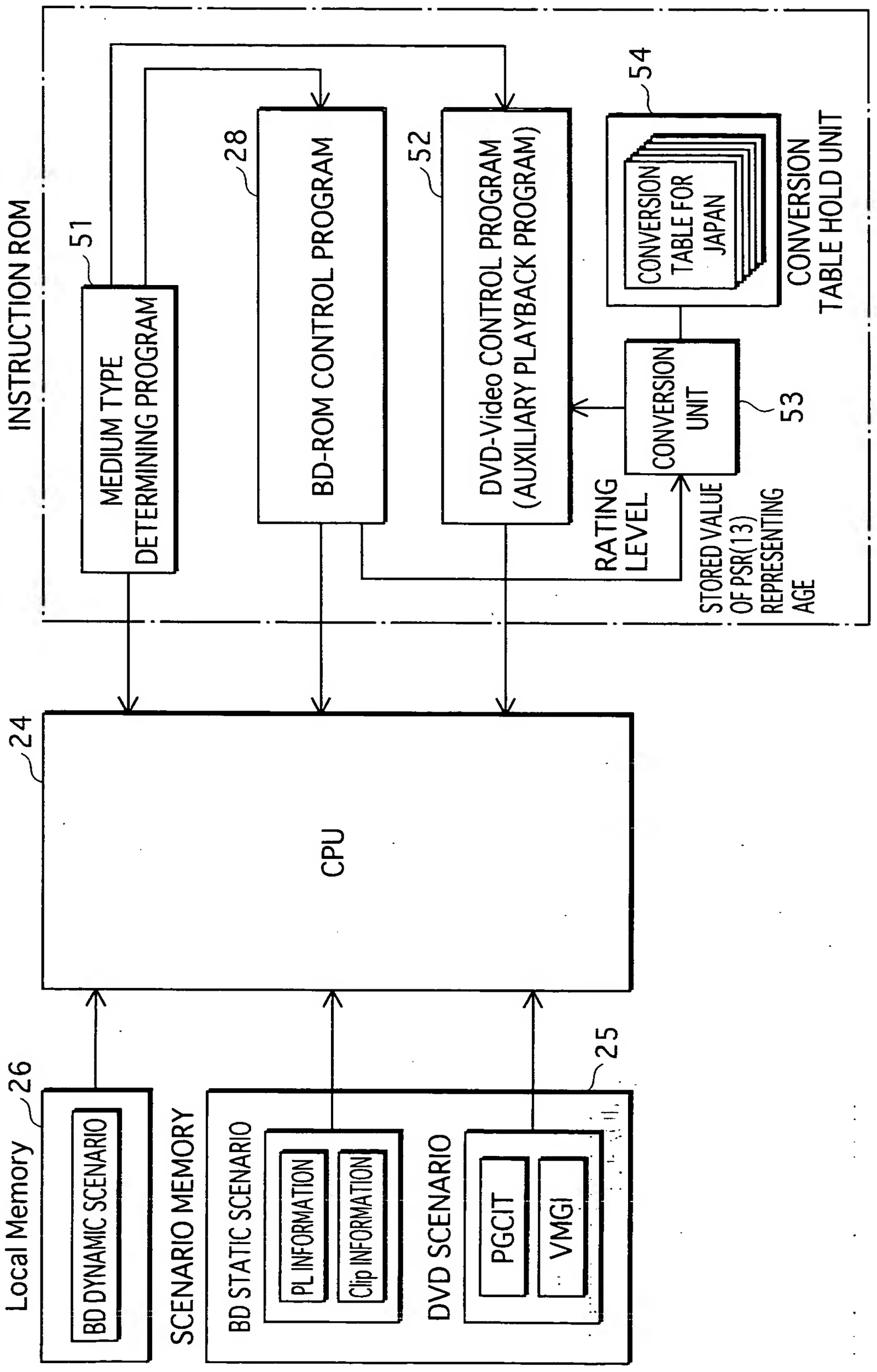

INSTRUCTION ROM
51
MEDIUM TYPE DETERMINING PROGRAM
28
BD-ROM CONTROL PROGRAM
52
DVD-Video CONTROL PROGRAM (AUXILIARY PLAYBACK PROGRAM)
54
CONVERSION TABLE FOR JAPAN
CONVERSION TABLE HOLD UNIT
53
CONVERSION UNIT
RATING LEVEL
STORED VALUE OF PSR(13) REPRESENTING AGE
24
CPU
26
Local Memory
BD DYNAMIC SCENARIO
SCENARIO MEMORY
BD STATIC SCENARIO
PL INFORMATION
Clip INFORMATION
DVD SCENARIO
PGCIT
VMGI
25

FIG.28

FIG.29

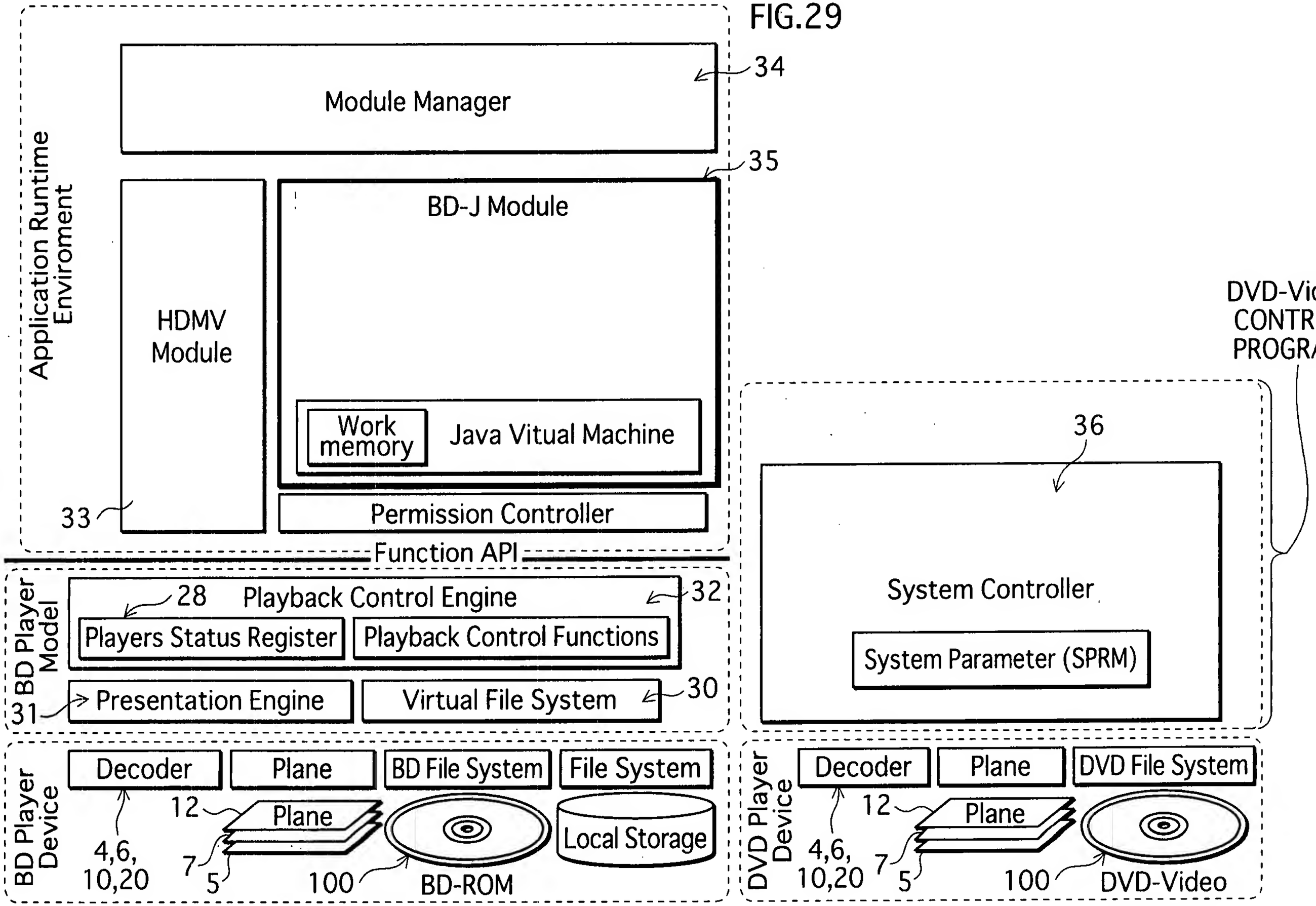


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FIG.30A

CONVERSION TABLE FOR JAPAN

ADULTS	18 YRS OLD
R	16 YRS OLD
GENERAL	0 YR OLD

FIG.30B

CONVERSION TABLE FOR US

X	20 YRS OLD
NC-17	17 YRS OLD
R	17 YRS OLD
PG-13	14 YRS OLD
PG	10 YRS OLD
G	0 YRS OLD

FIG.31A

CONVERSION TABLE FOR JAPAN

ADULTS	18 YRS OLD
R	16 YRS OLD
GENERAL	0 YR OLD

FIG.31B

CONVERSION TABLE FOR US

X	20 YRS OLD
NC-17	17 YRS OLD
R	17 YRS OLD
PG-13	14 YRS OLD
PG	10 YRS OLD
G	0 YRS OLD

FIG.32

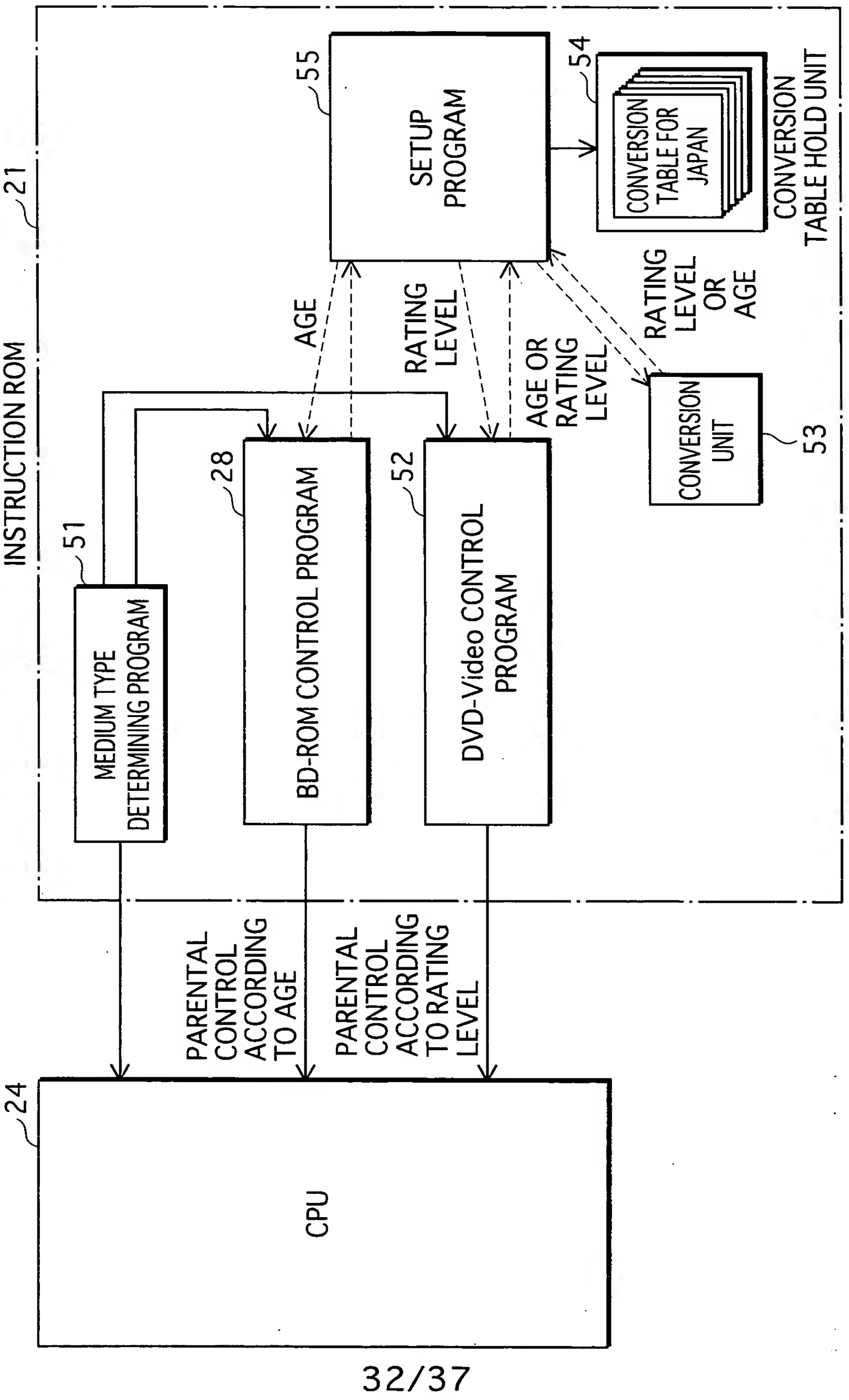

INSTRUCTION ROM
21
SETUP PROGRAM
55
CONVERSION TABLE FOR JAPAN
54
CONVERSION TABLE HOLD UNIT
AGE
RATING LEVEL
AGE OR RATING LEVEL
CONVERSION UNIT
53
MEDIUM TYPE DETERMINING PROGRAM
51
BD-ROM CONTROL PROGRAM
28
DVD-Video CONTROL PROGRAM
52
PARENTAL CONTROL ACCORDING TO AGE
PARENTAL CONTROL ACCORDING TO RATING LEVEL
CPU
24

FIG.33

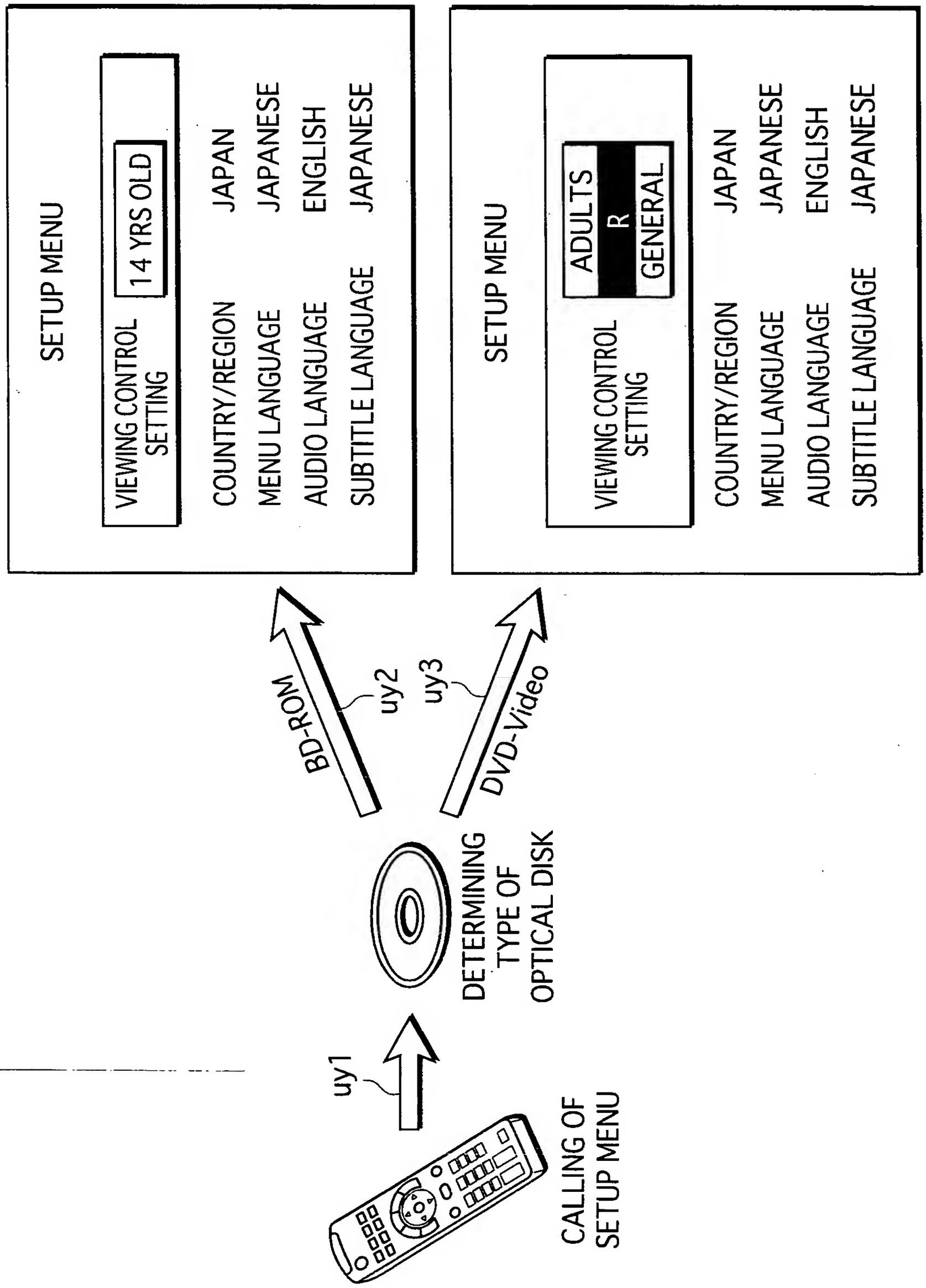

SETUP MENU
VIEWING CONTROL SETTING
14 YRS OLD
COUNTRY/REGION
JAPAN
MENU LANGUAGE
JAPANESE
AUDIO LANGUAGE
ENGLISH
SUBTITLE LANGUAGE
JAPANESE
SETUP MENU
VIEWING CONTROL SETTING
ADULTS
R
GENERAL
COUNTRY/REGION
JAPAN
MENU LANGUAGE
JAPANESE
AUDIO LANGUAGE
ENGLISH
SUBTITLE LANGUAGE
JAPANESE
BD-ROM
uy2
uy3
DVD-Video
DETERMINING TYPE OF OPTICAL DISK
uy1
CALLING OF SETUP MENU

FIG.34

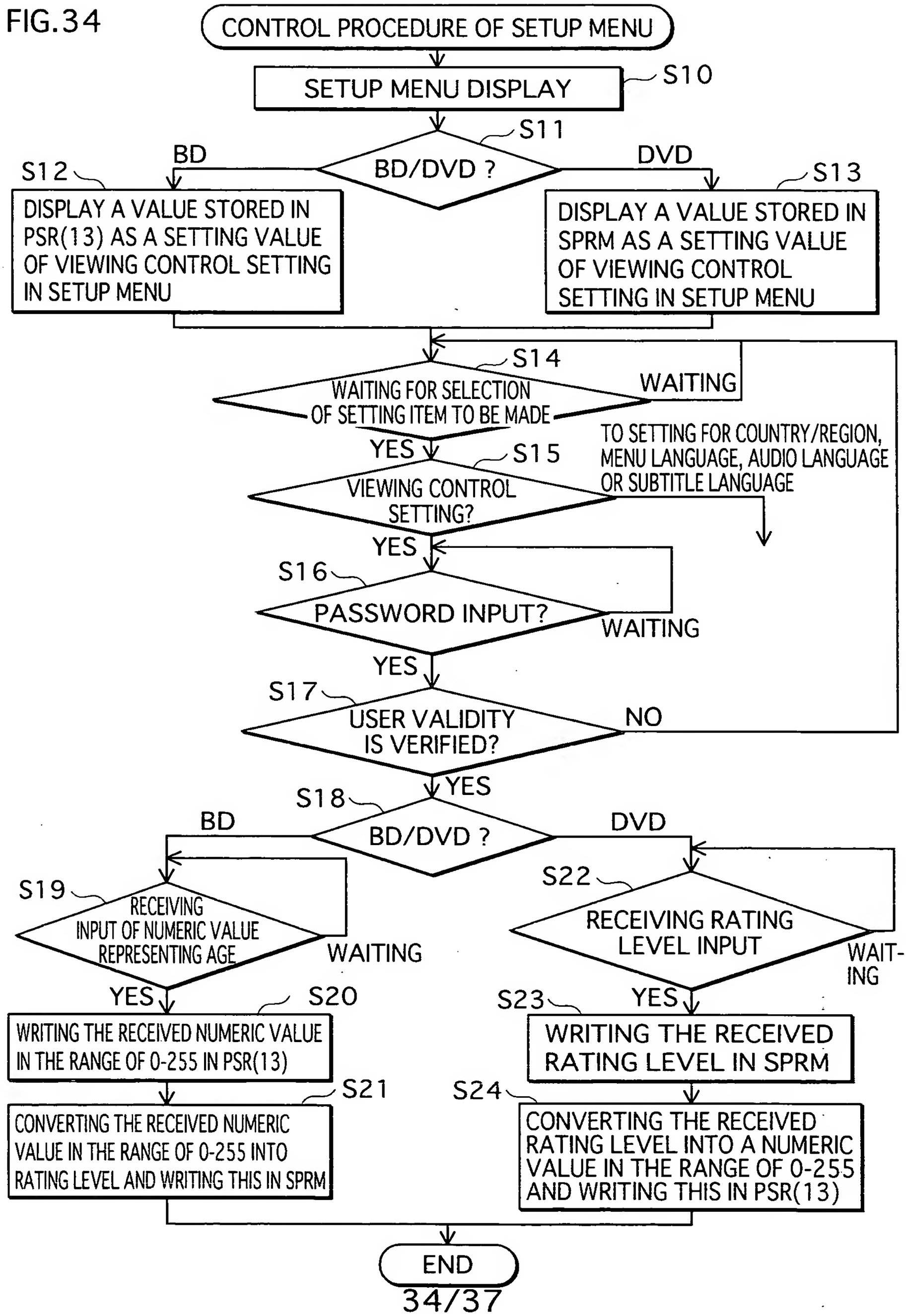

CONTROL PROCEDURE OF SETUP MENU
SETUP MENU DISPLAY
S10
S11
BD/DVD ?
BD
DVD
S12
DISPLAY A VALUE STORED IN PSR(13) AS A SETTING VALUE OF VIEWING CONTROL SETTING IN SETUP MENU
S13
DISPLAY A VALUE STORED IN SPRM AS A SETTING VALUE OF VIEWING CONTROL SETTING IN SETUP MENU
S14
WAITING FOR SELECTION OF SETTING ITEM TO BE MADE
WAITING
YES
S15
VIEWING CONTROL SETTING?
TO SETTING FOR COUNTRY/REGION, MENU LANGUAGE, AUDIO LANGUAGE OR SUBTITLE LANGUAGE
YES
S16
PASSWORD INPUT?
WAITING
YES
S17
USER VALIDITY IS VERIFIED?
NO
YES
S18
BD/DVD ?
BD
DVD
S19
RECEIVING INPUT OF NUMERIC VALUE REPRESENTING AGE
WAITING
S22
RECEIVING RATING LEVEL INPUT
WAIT-ING
YES
S20
WRITING THE RECEIVED NUMERIC VALUE IN THE RANGE OF 0-255 IN PSR(13)
S21
CONVERTING THE RECEIVED NUMERIC VALUE IN THE RANGE OF 0-255 INTO RATING LEVEL AND WRITING THIS IN SPRM
YES
S23
WRITING THE RECEIVED RATING LEVEL IN SPRM
S24
CONVERTING THE RECEIVED RATING LEVEL INTO A NUMERIC VALUE IN THE RANGE OF 0-255 AND WRITING THIS IN PSR(13)
END

FIG.35

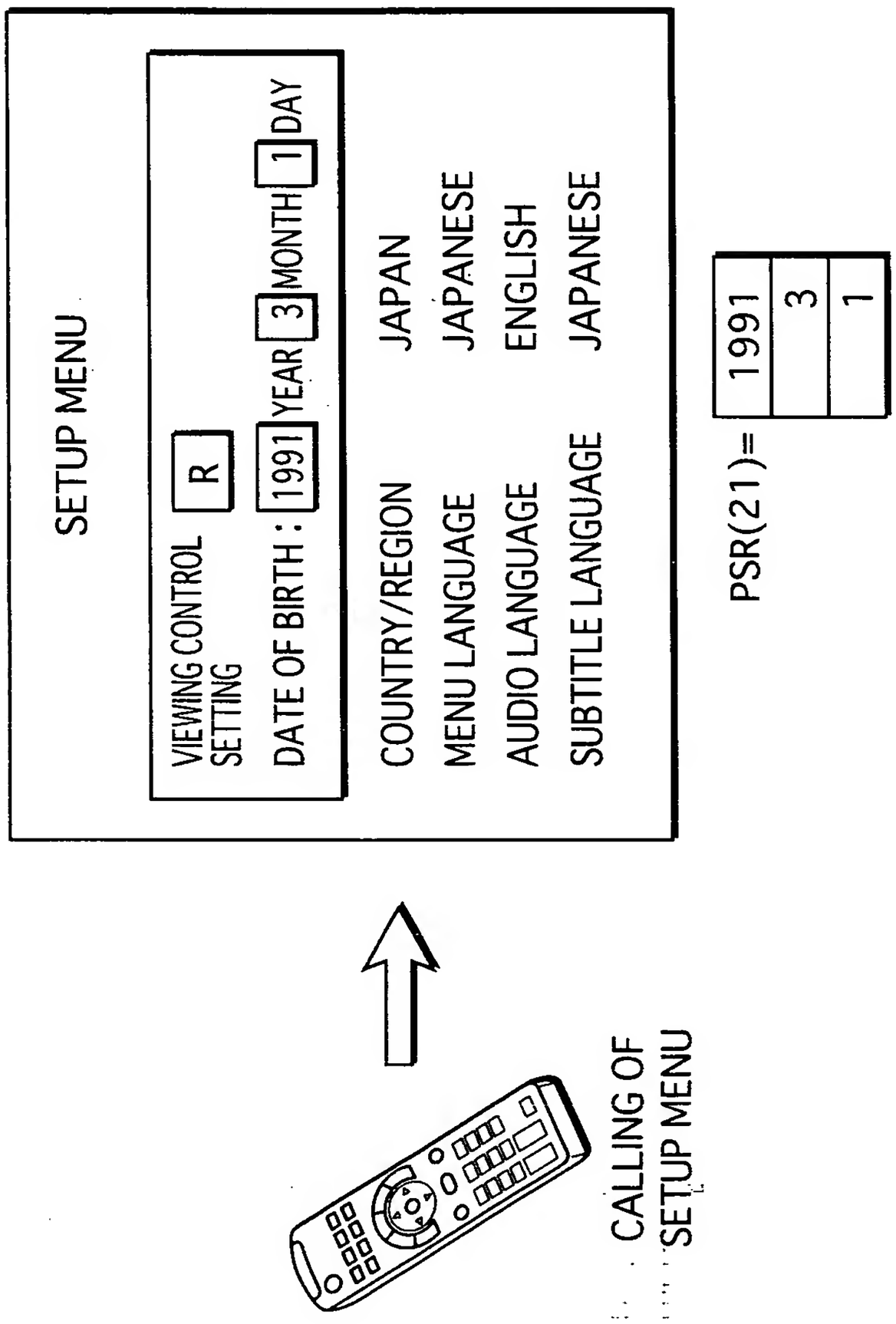

SETUP MENU
VIEWING CONTROL SETTING
R
DATE OF BIRTH : 1991 YEAR 3 MONTH 1 DAY
COUNTRY/REGION JAPAN
MENU LANGUAGE JAPANESE
AUDIO LANGUAGE ENGLISH
SUBTITLE LANGUAGE JAPANESE
PSR(21)= 1991 3 1
CALLING OF SETUP MENU

FIG.36

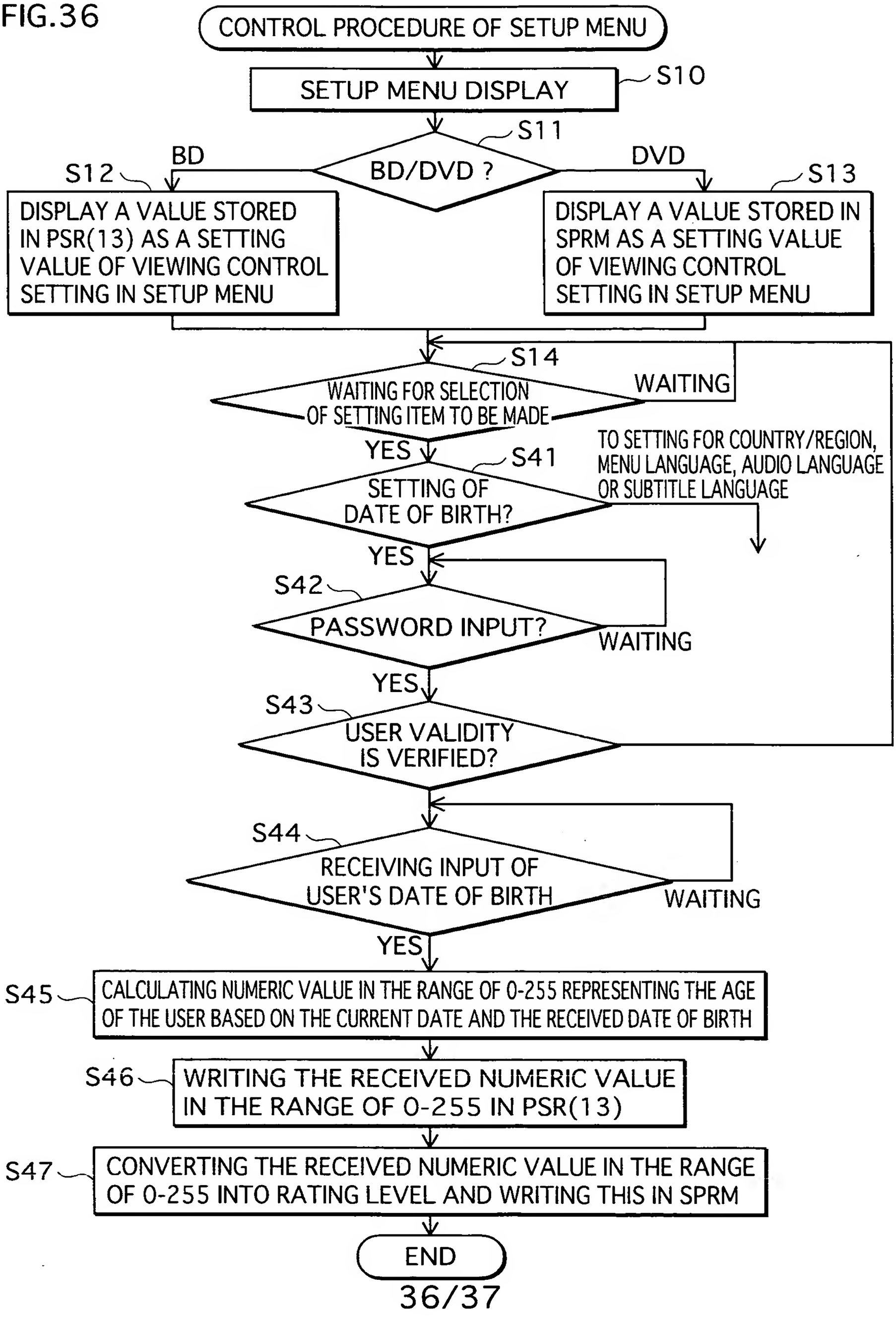
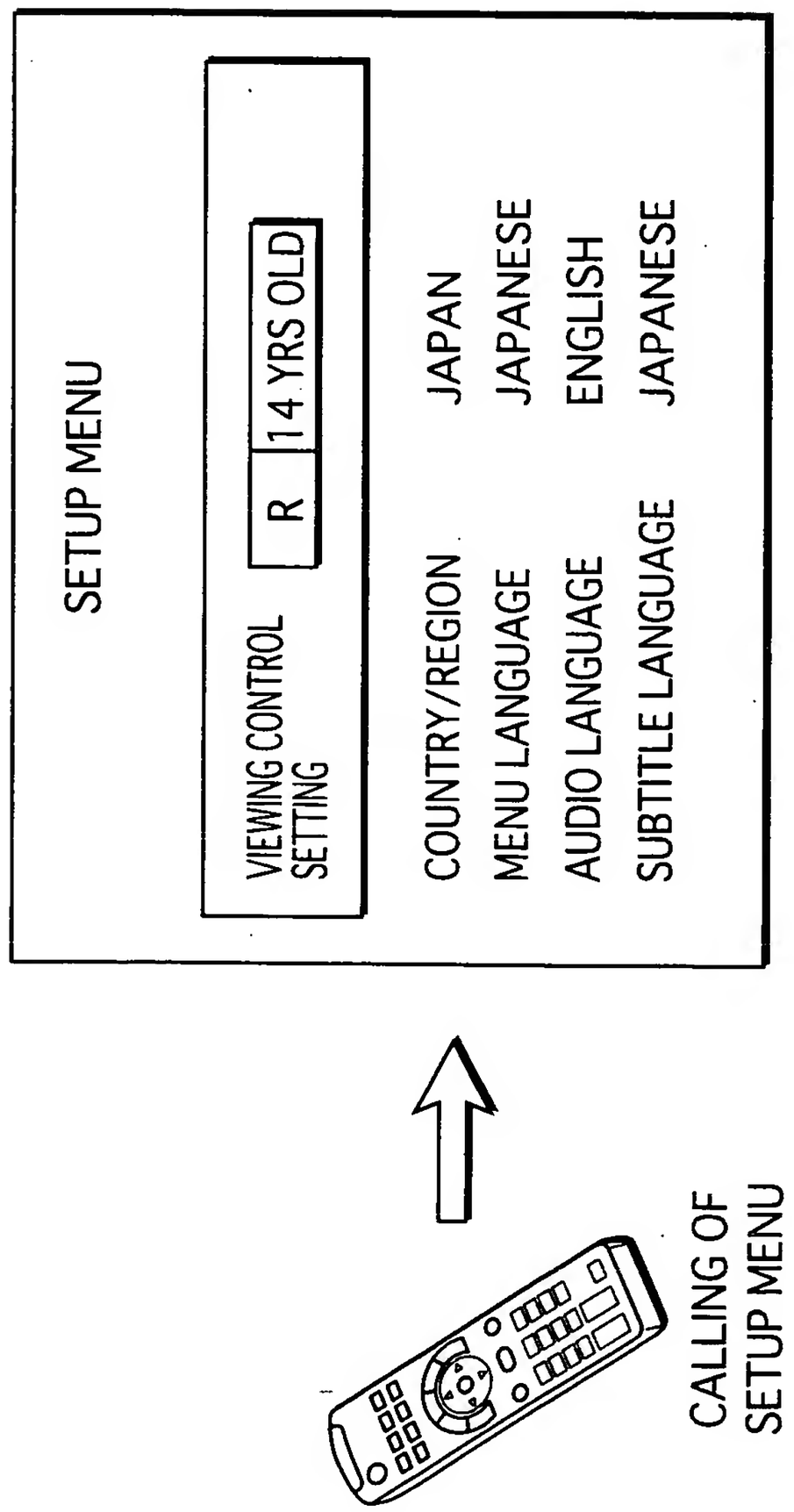

CONTROL PROCEDURE OF SETUP MENU
SETUP MENU DISPLAY
S10
S11
BD/DVD ?
BD
DVD
S12
DISPLAY A VALUE STORED IN PSR(13) AS A SETTING VALUE OF VIEWING CONTROL SETTING IN SETUP MENU
S13
DISPLAY A VALUE STORED IN SPRM AS A SETTING VALUE OF VIEWING CONTROL SETTING IN SETUP MENU
S14
WAITING FOR SELECTION OF SETTING ITEM TO BE MADE
WAITING
YES
S41
SETTING OF DATE OF BIRTH?
TO SETTING FOR COUNTRY/REGION, MENU LANGUAGE, AUDIO LANGUAGE OR SUBTITLE LANGUAGE
YES
S42
PASSWORD INPUT?
WAITING
YES
S43
USER VALIDITY IS VERIFIED?
S44
RECEIVING INPUT OF USER'S DATE OF BIRTH
WAITING
YES
S45
CALCULATING NUMERIC VALUE IN THE RANGE OF 0-255 REPRESENTING THE AGE OF THE USER BASED ON THE CURRENT DATE AND THE RECEIVED DATE OF BIRTH
S46
WRITING THE RECEIVED NUMERIC VALUE IN THE RANGE OF 0-255 IN PSR(13)
S47
CONVERTING THE RECEIVED NUMERIC VALUE IN THE RANGE OF 0-255 INTO RATING LEVEL AND WRITING THIS IN SPRM
END

FIG.37


SETUP MENU
VIEWING CONTROL SETTING
R
14 YRS OLD
COUNTRY/REGION
JAPAN
MENU LANGUAGE
JAPANESE
AUDIO LANGUAGE
ENGLISH
SUBTITLE LANGUAGE
JAPANESE
CALLING OF SETUP MENU